



7017
John C. Trautwine 1853 2^d edition

The field practice for laying
out circular curves for
Rail. roads.

2410 / 250

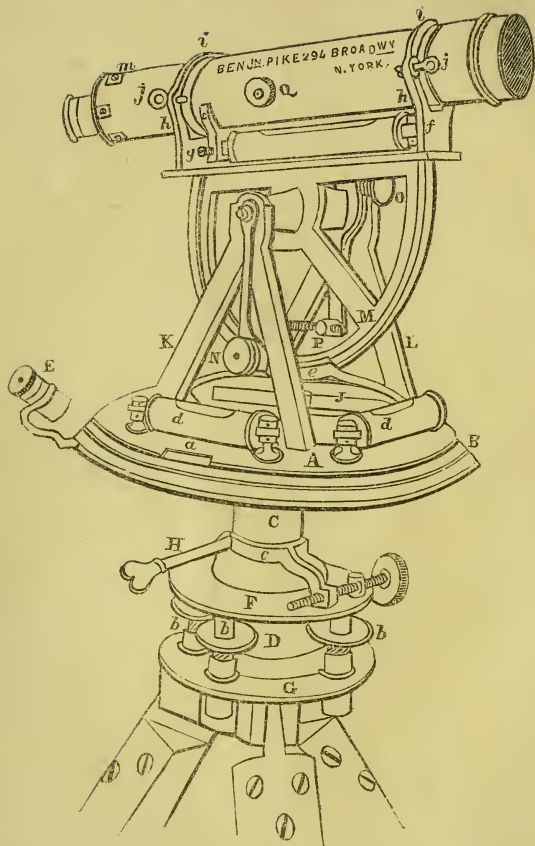
Wm A Bunt's
Book

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X-65800



ENGINEER'S,
CONTRACTOR'S AND SURVEYOR'S
POCKET TABLE-BOOK.

COMPRISING

LOGARITHMS OF NUMBERS; LOGARITHMIC SINES AND TANGENTS; NATURAL
SINES AND NATURAL TANGENTS; THE TRAVERSE TABLE; AND A FULL
AND COMPLETE SET OF EXCAVATION AND EMBANKMENT TABLES;
TOGETHER WITH NUMEROUS OTHER VALUABLE TABLES
FOR ENGINEERS, &c.

BY J. M. SCRIBNER, A. M.

AUTHOR OF "ENGINEER'S AND MECHANIC'S COMPANION," &c., &c.

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PREFACE.

SHORTLY after the publication of the "*Engineer's and Mechanic's Companion*," it was suggested to the author, by several distinguished engineers, that a *pocket* edition of a Text-book, comprising all the useful Tables commonly required in the field or office, would be highly serviceable to those engaged in practical engineering and surveying. Prompted by their repeated and urgent solicitations to furnish a work of this kind, with Tables adapted to immediate estimation of excavations and embankments, together with such other useful Tables of the results of valuable and costly experiments upon the strength of materials and the like, the following pages have been compiled; and much that is entirely new has been carefully computed expressly for this work.

The Logarithmic Tables, Sines and Tangents have been culled from the most authentic and approved sources; and as great pains have been taken in their revisal, the author feels an unusual degree of confidence in their correctness. Besides, they have been carefully compared with several *different* editions, by other authors, in order to have the benefit of their watchfulness in detecting inaccuracies.

The Tables of Excavations and Embankments, for facilitating the calculations of earth-work on railroads and canals, will be found exceedingly serviceable and convenient for the practical engineer and contractor, as they will prove a great saving of time, and will serve to prove their own calculations, when otherwise, through the hurry and multiplicity of business, they might seem doubtful.

One other advantage to contractors, accruing from the use of these Tables, not originally contemplated, is this: By the common, but erroneous, methods of calculation, the cuttings may appear to equal the embankments; yet, when the work is carried into effect, a large quantity of earth may be required to make up the embankments, or there may be too much earth for that purpose in the cuttings, according to the shape or figures of the sections. This, in most cases, arises from erroneous calculations; for the common practice is, either to add the two extreme heights, and take half the sum for the mean height, or to take half the sum of the areas of the two ends for a mean area. Of course, one makes the quantity too much, and the other too little. Such, however, are not likely to be the errors of a good engineer, and they cannot occur if these tables be used: for as they are calculated from the *prismoïdal* formula, the demonstration and

figure of which accompany the tables, they will give the true cubic quantity in any cutting or embankment.

The Table for ascertaining the quantity of land necessary for the formation of a railroad or canal, will be found of much service.

The remaining miscellaneous Tables will no doubt prove of great practical utility to the engineer and contractor, in making estimates for public works, &c.

The surveyor also will find this a convenient *pocket edition* of Tables, applicable to all the purposes of his business.

As it was primarily designed to make this a book purely of Tables, without reference to elementary instruction, every Table inserted has been deemed of especial importance to those for whose use the work is intended; and while all such have been carefully compiled and computed, all extraneous or irrelevant matter has been, with equal care, excluded.

In offering a treatise of this nature to the public, the author can of course make few claims to originality, nor has it been his object to produce an original work. The principal authors consulted, in preparing it for the press, are HUTTON, HASSLER, and McNEIL; and, besides these sources of information, he has been essentially aided in his own efforts by several distinguished professional gentlemen, who have kindly advised in the selection of valuable and useful Tables, and, to some extent, furnished *materiel* for the work.

That the production might be rendered still more worthy of general patronage, several diagrams have been annexed, which add much to its value in regard to practical utility.

In conclusion, the author will merely add a hope, that the engineer, contractor, and surveyor, and all others interested in this branch of science, will find this an acceptable companion and assistant, and that they will duly appreciate his endeavors to furnish such a work as shall meet their varied requirements.

J. M. S.

Middleburgh, N. Y., July, 1847.

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TABLE,

CONTAINING

THE LOGARITHMS OF NUMBERS

FROM 1 TO 10,000.

NUMBERS FROM 1 TO 100 AND THEIR LOGARITHMS,

WITH THEIR INDICES.

No.	Logarithm.	No.	Logarithm.	No.	Logarithm.	No.	Logarithm.	No.	Logarithm.
1	0.000000	21	1.322219	41	1.612784	61	1.785330	81	1.908495
2	0.301030	22	1.342423	42	1.623240	62	1.792392	82	1.913814
3	0.477121	23	1.361728	43	1.633468	63	1.799341	83	1.919078
4	0.602060	24	1.380211	44	1.643453	64	1.806180	84	1.924279
5	0.698970	25	1.397940	45	1.653213	65	1.812913	85	1.929419
6	0.778151	26	1.414973	46	1.662753	66	1.819544	86	1.934498
7	0.845098	27	1.431364	47	1.672098	67	1.826075	87	1.939519
8	0.903090	28	1.447158	48	1.681241	68	1.832509	88	1.944483
9	0.954243	29	1.462398	49	1.690196	69	1.838849	89	1.949390
10	1.000000	30	1.477121	50	1.698970	70	1.845098	90	1.954243
11	1.041393	31	1.491362	51	1.707579	71	1.851258	91	1.959041
12	1.079181	32	1.505150	52	1.716003	72	1.857332	92	1.963788
13	1.113943	33	1.518514	53	1.724276	73	1.863323	93	1.968483
14	1.146128	34	1.531479	54	1.732394	74	1.869232	94	1.973128
15	1.176091	35	1.544068	55	1.740363	75	1.875061	95	1.977724
16	1.204120	36	1.556303	56	1.748188	76	1.880814	96	1.982271
17	1.230449	37	1.568202	57	1.755875	77	1.886491	97	1.986772
18	1.255273	38	1.579784	58	1.763428	78	1.892095	98	1.991223
19	1.278754	39	1.591065	59	1.770852	79	1.897627	99	1.995635
20	1.301030	40	1.602060	60	1.778151	80	1.903090	100	2.000000

NOTE.—In the following part of the Table, the Indices are omitted, as they can be very easily supplied. Thus, the index of the logarithm of every integer number, consisting only of one number, is 0; of two figures, 1; of three figures, 2; of four figures, 3: being always a unit less than the number of figures contained in the integer number. The index to the logarithm of every number above 100, in the following part of the Table, is omitted; yet, in the operation, it must be prefixed, according to this remark: so that the logarithm of 600 is 2.77815, and that of 6000 is 3.77815, and so of the rest.

No.	0	1	2	3	4	5	6	7	8	9	Diff.
100	000000	000434	000868	001301	001734	002166	002598	003029	003461	003891	432
1	4321	4751	5181	5609	6038	6466	6894	7321	7748	8174	428
2	8600	9026	9451	9876	010300	010724	011147	011570	011993	012415	424
3	012837	013259	013680	014100	4521	4940	5360	5779	6197	6616	420
4	7033	7451	7868	8284	8700	9116	9532	9947	020361	020775	416
5	021189	021603	022016	022428	022841	023252	023664	024075	4486	4896	412
6	5306	5715	6125	6533	6942	7350	7757	8164	8571	8978	408
7	9384	9789	030195	030600	031004	031408	031812	032216	032619	033021	404
8	033424	033826	4227	4628	5029	5430	5830	6230	6629	7028	400
9	7426	7825	8223	8620	9017	9414	9811	040207	040602	040998	397
110	041393	041787	042182	042576	042969	043362	043755	044148	044540	044932	393
1	5323	5714	6105	6495	6885	7275	7664	8053	8442	8830	390
2	9218	9606	9993	050380	050766	051153	051538	051924	052309	052694	386
3	053078	053463	053846	4230	4613	4996	5378	5760	6142	6524	383
4	6905	7286	7666	8046	8426	8805	9185	9563	9942	060320	379
5	060698	061075	061452	061829	062206	062582	062958	063333	063709	4083	376
6	4458	4832	5206	5580	5953	6326	6699	7071	7443	7815	373
7	8186	8557	8928	9298	9668	070038	070407	070776	071145	071514	370
8	071882	072250	072617	072985	073352	3718	4085	4451	4816	5182	366
9	5547	5912	6276	6640	7004	7368	7731	8094	8457	8819	363
120	079181	079543	079904	080266	080626	080987	081347	081707	082067	082426	360
1	082785	083144	083503	3861	4219	4576	4934	5291	5647	6004	357
2	6360	6716	7071	7426	7781	8136	8490	8845	9198	9552	355
3	9905	090258	090611	090963	091315	091667	092018	092370	092721	093071	352
4	093422	3772	4122	4471	4820	5169	5518	5866	6215	6562	349
5	6910	7257	7604	7951	8298	8644	8990	9335	9681	100026	346
6	100371	100715	101059	101403	101747	102091	102434	102777	103119	3462	343
7	3804	4146	4487	4828	5169	5510	5851	6191	6531	6871	341
8	7210	7549	7888	8227	8565	8903	9241	9579	9916	110253	338
9	110590	110926	111263	111599	111934	112270	112605	112940	113275	3609	335
130	113943	114277	114611	114944	115278	115611	115943	116276	116608	116940	333
1	7271	7603	7934	8265	8595	8926	9256	9586	9915	120245	330
2	120574	120903	121231	121560	121888	122216	122544	122871	123198	3525	328
3	3852	4178	4504	4830	5156	5481	5806	6131	6456	6781	325
4	7105	7429	7753	8076	8399	8722	9045	9368	9690	130012	323
5	130334	130655	130977	131298	131619	131939	132260	132580	132900	3219	321
6	3539	3858	4177	4496	4814	5133	5451	5769	6086	6403	318
7	6721	7037	7354	7671	7987	8303	8618	8934	9249	9564	316
8	9879	140194	140508	140822	141136	141450	141763	142076	142389	142702	314
9	143015	3327	3639	3951	4263	4574	4885	5196	5507	5818	311
140	146128	146438	146748	147058	147367	147676	147985	148294	148603	148911	309
1	9219	9527	9835	150142	150449	150756	151063	151370	151676	151982	307
2	152288	152594	152900	3205	3510	3815	4120	4424	4728	5032	305
3	5336	5640	5943	6246	6549	6852	7154	7457	7759	8061	303
4	8362	8664	8965	9266	9567	9868	160168	160469	160769	161068	301
5	161368	161667	161967	162266	162564	162863	3161	3460	3758	4055	299
6	4353	4650	4947	5244	5541	5838	6134	6430	6726	7022	297
7	7317	7613	7908	8203	8497	8792	9086	9380	9674	9968	295
8	170262	170555	170848	171141	171434	171726	172019	172311	172603	172895	293
9	3186	3478	3769	4060	4351	4641	4932	5222	5512	5802	291
150	176091	176381	176670	176959	177248	177536	177825	178113	178401	178689	289
1	8977	9264	9552	9839	180126	180413	180699	180986	181272	181558	287
2	181844	182129	182415	182700	2985	3270	3555	3839	4123	4407	285
3	4691	4975	5259	5542	5825	6108	6391	6674	6956	7239	283
4	7521	7803	8084	8366	8647	8928	9209	9490	9771	190051	281
5	190332	190612	190892	191171	191451	191730	192010	192289	192567	2846	279
6	3125	3403	3681	3959	4237	4514	4792	5069	5346	5623	278
7	5900	6176	6453	6729	7005	7281	7556	7832	8107	8382	276
8	8657	8932	9206	9481	9755	200020	200303	200577	200850	201124	274
9	201397	201670	201943	202216	202488	2761	3033	3305	3577	3848	272

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2	9515	9783	210051	210319	210586	210853	211121	211388	211654	211921	267
3	212188	212454	2720	2986	3252	3518	3783	4049	4314	4579	266
4	4844	5109	5373	5638	5902	6166	6430	6694	6957	7221	264
5	7481	7747	8010	8273	8536	8798	9060	9323	9585	9846	262
6	220168	220370	220631	220892	221153	221414	221675	221936	222196	222456	261
7	2716	2976	3236	3496	3755	4015	4274	4533	4792	5051	259
8	5309	5568	5826	6084	6342	6600	6858	7115	7372	7630	258
9	7887	8144	8400	8657	8913	9170	9426	9682	9938	230193	256
170	230449	230704	230960	231215	231470	231724	231979	232234	232488	232742	255
1	2306	3250	3504	3757	4011	4264	4517	4770	5023	5276	253
2	5523	5781	6033	6285	6537	6789	7041	7292	7544	7795	252
3	8046	8297	8548	8799	9049	9299	9550	9800	240050	240300	250
4	240549	240799	241048	241297	241546	241795	242044	242293	2541	2750	249
5	3338	3586	3834	3782	4030	4277	4525	4772	5019	5266	248
6	5513	5759	6006	6252	6499	6745	6991	7237	7482	7728	246
7	7973	8219	8464	8709	8954	9198	9443	9687	9932	251176	245
8	250420	250664	250908	251151	251395	251638	251881	252125	252368	2610	243
9	2853	3096	3338	3580	3822	4064	4306	4548	4790	5031	242
180	255273	255514	255755	255996	256237	256477	256718	256958	257198	257439	241
1	7679	7918	8158	8398	8637	8877	9116	9355	9594	9833	239
2	260071	260310	260548	260787	261025	261263	261501	261739	261976	262214	238
3	2451	2688	2925	3162	3399	3636	3873	4109	4346	4582	237
4	4818	5054	5290	5525	5761	5996	6232	6467	6702	6937	235
5	7172	7406	7641	7875	8110	8344	8578	8812	9046	9279	234
6	9513	9746	9980	270213	270446	270679	270912	271144	271377	271609	233
7	271842	272074	272306	2538	2770	3001	3233	3464	3696	3927	232
8	4158	4389	4620	4850	5081	5311	5542	5772	6002	6232	230
9	6462	6692	6921	7151	7380	7609	7838	8067	8296	8525	229
190	278754	278992	279231	279469	279667	279895	280123	280351	280578	280806	228
1	281033	281261	281488	281715	281942	282169	282396	2622	2849	3075	227
2	3301	3527	3753	3979	4205	4431	4656	4882	5107	5332	226
3	5557	5782	6007	6232	6456	6681	6905	7130	7354	7578	225
4	7802	8026	8249	8473	8696	8920	9143	9366	9589	9812	223
5	290035	290257	290480	290702	290925	291147	291369	291591	291813	292034	222
6	2256	2478	2699	2920	3141	3363	3584	3804	4025	4246	221
7	4466	4687	4907	5127	5347	5567	5787	6007	6226	6446	220
8	6665	6884	7104	7323	7542	7761	7979	8198	8416	8635	219
9	8853	9071	9289	9507	9725	9943	300161	300378	300595	300813	218
200	301030	301247	301464	301681	301898	302114	302331	302547	302764	302980	217
1	3196	3412	3628	3844	4059	4275	4491	4706	4921	5136	216
2	5351	5566	5781	5996	6211	6425	6639	6854	7068	7282	215
3	7496	7710	7924	8137	8351	8564	8778	8991	9204	9417	213
4	9630	9843	310056	310268	310481	310693	310906	311118	311330	311542	212
5	311754	311966	2177	2389	2600	2812	3023	3234	3445	3656	211
6	3867	4078	4289	4499	4710	4920	5130	5340	5551	5760	210
7	5970	6180	6390	6599	6809	7018	7227	7436	7646	7854	209
8	8063	8272	8481	8689	8898	9106	9314	9522	9730	9938	208
9	320146	320354	320562	320769	320977	321184	321391	321598	321805	322012	207
210	322219	322426	322633	322839	323046	323252	323458	323665	323871	324077	206
1	4282	4488	4694	4899	5105	5310	5516	5721	5926	6131	205
2	6336	6541	6745	6950	7155	7359	7563	7767	7972	8176	204
3	8380	8583	8787	8991	9194	9398	9601	9805	330008	330211	203
4	330414	330617	330819	331022	331225	331427	331630	331832	2034	2236	202
5	2438	2640	2842	3044	3246	3447	3649	3850	4051	4253	202
6	4454	4655	4856	5057	5257	5458	5658	5859	6059	6260	201
7	6460	6660	6860	7060	7260	7459	7659	7858	8058	8257	200
8	8456	8656	8855	9054	9253	9451	9650	9849	340047	340246	199
9	340444	340642	340841	341039	341237	341435	341632	341830	2028	2225	198

No.	0	1	2	3	4	5	6	7	8	9	Diff.
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No.	0	1	2	3	4	5	6	7	8	9	Diff.
220	342423	342620	342817	343014	343212	343409	343606	343802	343999	344196	197
1	4392	4589	4785	4981	5178	5374	5570	5766	5962	6157	196
2	6353	6549	6744	6939	7135	7330	7525	7720	7915	8110	195
3	8305	8500	8694	8889	9083	9278	9472	9666	9860	350054	194
4	350248	350442	350636	350829	351023	351216	351410	351603	351796	1989	193
5	2183	2375	2568	2761	2954	3147	3339	3532	3724	3916	193
6	4103	4301	4493	4685	4876	5068	5260	5452	5643	5834	192
7	6026	6217	6408	6599	6790	6981	7172	7363	7554	7744	191
8	7935	8125	8316	8506	8696	8886	9076	9266	9456	9646	190
9	9835	369025	360215	360404	360593	360782	360972	361161	361350	361539	189
230	361728	361917	362105	362294	362482	362671	362859	363048	363236	363424	188
1	3612	3800	3988	4176	4363	4551	4739	4926	5113	5301	188
2	5488	5675	5862	6049	6236	6423	6610	6796	6983	7169	187
3	7356	7542	7729	7915	8101	8287	8473	8659	8845	9030	186
4	9216	9401	9587	9772	9958	370143	370328	370513	370698	370883	185
5	371068	371253	371437	371622	371806	1991	2175	2360	2544	2728	184
6	2912	3096	3280	3464	3647	3831	4015	4198	4382	4565	184
7	4748	4932	5115	5298	5481	5664	5846	6029	6212	6394	183
8	6577	6759	6942	7124	7306	7488	7670	7852	8034	8216	182
9	8398	8580	8761	8943	9124	9306	9487	9668	9849	380030	181
240	380211	380392	380573	380754	380934	381115	381296	381476	381656	381837	181
1	2017	2197	2377	2557	2737	2917	3097	3277	3456	3636	180
2	3815	3995	4174	4353	4533	4712	4891	5070	5249	5428	179
3	5606	5785	5964	6142	6321	6499	6677	6856	7034	7212	178
4	7390	7568	7746	7923	8101	8279	8456	8634	8811	8989	178
5	9166	9343	9520	9698	9875	390051	390228	390405	390582	390759	177
6	390935	391112	391288	391464	391641	1817	1993	2169	2345	2521	176
7	2697	2873	3048	3224	3400	3575	3751	3926	4101	4277	176
8	4452	4627	4802	4977	5152	5326	5501	5676	5850	6025	175
9	6199	6374	6548	6722	6896	7071	7245	7419	7592	7766	174
250	397940	398114	398287	398461	398634	398808	398981	399154	399328	399501	173
1	9674	9847	400020	400192	400365	400538	400711	400883	401056	401228	173
2	401401	401573	1745	1917	2089	2261	2433	2605	2777	2949	172
3	3121	3292	3464	3635	3807	3978	4149	4320	4492	4663	171
4	4834	5005	5176	5346	5517	5688	5858	6029	6199	6370	171
5	6540	6710	6881	7051	7221	7391	7561	7731	7901	8070	170
6	8240	8410	8579	8749	8918	9087	9257	9426	9595	9764	169
7	9933	410102	410271	410440	410609	410777	410946	411114	411283	411451	169
8	411620	1788	1956	2124	2293	2461	2629	2796	2964	3132	168
9	3300	3467	3635	3803	3970	4137	4305	4472	4639	4806	167
260	414973	415140	415307	415474	415641	415808	415974	416141	416308	416474	167
1	6041	6807	6973	7139	7306	7472	7638	7804	7970	8135	166
2	8301	8467	8633	8798	8964	9129	9295	9460	9625	9791	165
3	9956	420121	420286	420451	420616	420781	420945	421110	421275	421439	165
4	421604	1768	1933	2097	2261	2426	2590	2754	2918	3082	164
5	3246	3410	3574	3737	3901	4065	4228	4392	4555	4718	164
6	4882	5045	5208	5371	5534	5697	5860	6023	6186	6349	163
7	6511	6674	6836	6999	7161	7324	7486	7648	7811	7973	162
8	8135	8297	8459	8621	8783	8944	9106	9268	9429	9591	162
9	9752	9914	430075	430236	430398	430559	430720	430881	431042	431203	161
270	431364	431525	431685	431846	432007	432167	432328	432488	432649	432809	161
1	2969	3130	3290	3450	3610	3770	3930	4090	4249	4409	160
2	4569	4729	4888	5048	5207	5367	5526	5685	5844	6004	159
3	6163	6322	6481	6640	6799	6957	7116	7275	7433	7592	159
4	7751	7909	8067	8226	8384	8542	8701	8859	9017	9175	158
5	9333	9491	9648	9806	9964	440122	440279	440437	440594	440752	158
6	440809	441066	441224	441381	441538	1695	1852	2009	2166	2323	157
7	2480	2637	2793	2950	3106	3263	3419	3576	3732	3889	157
8	4045	4201	4357	4513	4669	4825	4981	5137	5293	5449	156
9	5604	5760	5915	6071	6226	6382	6537	6692	6848	7003	155

No.	0	1	2	3	4	5	6	7	8	9	Diff.
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280	447158	447313	447468	447623	447778	447933	448088	448242	448397	448552	155
1	8706	8861	9015	9170	9324	9478	9633	9787	9941	450095	154
2	450249	450403	450557	450711	450865	451018	451172	451326	451479	1633	154
3	1786	1940	2093	2247	2400	2553	2706	2859	3012	3165	153
4	3318	3471	3624	3777	3930	4082	4235	4387	4540	4692	153
5	4845	4997	5150	5302	5454	5606	5758	5910	6062	6214	152
6	6366	6518	6670	6821	6973	7125	7276	7428	7579	7731	152
7	7882	8033	8184	8336	8487	8638	8789	8940	9091	9242	151
8	9392	9543	9694	9845	9995	460146	460296	460447	460597	460748	151
9	460898	461048	461198	461348	461499	1649	1799	1948	2098	2248	150
290	462398	462548	462697	462847	462997	463146	463296	463445	463594	463744	150
1	3893	4042	4191	4340	4490	4639	4788	4936	5085	5234	149
2	5383	5532	5680	5829	5977	6126	6274	6423	6571	6719	149
3	6868	7016	7164	7312	7460	7608	7756	7904	8052	8200	148
4	8347	8495	8643	8790	8938	9085	9233	9380	9527	9675	148
5	9822	9969	470116	470263	470410	470557	470704	470851	470998	471145	147
6	471292	471438	1585	1732	1878	2025	2171	2318	2464	2610	146
7	2756	2903	3049	3195	3341	3487	3633	3779	3925	4071	146
8	4216	4362	4508	4653	4799	4944	5090	5235	5381	5526	146
9	5671	5816	5962	6107	6252	6397	6542	6687	6832	6976	145
300	477121	477266	477411	477555	477700	477844	477989	478133	478278	478422	145
1	8566	8711	8855	8999	9143	9287	9431	9575	9719	9863	144
2	480007	480151	480294	480438	480582	480725	480869	481012	481156	481299	144
3	1443	1586	1729	1872	2016	2159	2302	2445	2588	2731	143
4	2874	3016	3159	3302	3445	3587	3730	3872	4015	4157	143
5	4300	4442	4585	4727	4869	5011	5153	5295	5437	5579	142
6	5721	5863	6005	6147	6289	6430	6572	6714	6855	6997	142
7	7138	7280	7421	7563	7704	7845	7986	8127	8268	8410	141
8	8551	8692	8833	8974	9114	9255	9396	9537	9677	9818	141
9	9958	490099	490239	490380	490520	490661	490801	490941	491081	491222	140
310	491362	491502	491642	491782	491922	492062	492201	492341	492481	492621	140
1	2760	2900	3040	3179	3319	3458	3597	3737	3876	4015	139
2	4155	4294	4433	4572	4711	4850	4989	5128	5267	5406	139
3	5544	5683	5822	5960	6099	6238	6376	6515	6653	6791	139
4	6930	7068	7206	7344	7483	7621	7759	7897	8035	8173	138
5	8311	8448	8586	8724	8862	8999	9137	9275	9412	9550	138
6	9687	9824	9962	500099	500236	500374	500511	500648	500785	500922	137
7	501059	501196	501333	1470	1607	1744	1880	2017	2154	2291	137
8	2427	2564	2700	2837	2973	3109	3246	3382	3518	3655	136
9	3791	3927	4063	4199	4335	4471	4607	4743	4878	5014	136
320	505150	505286	505421	505557	505693	505828	505964	506099	506234	506370	136
1	6505	6640	6776	6911	7046	7181	7316	7451	7586	7721	135
2	7856	7991	8126	8260	8395	8530	8664	8799	8934	9068	135
3	9203	9337	9471	9606	9740	9874	510099	510143	510277	510411	134
4	510545	510679	510813	510947	511081	511215	1349	1482	1616	1750	134
5	1883	2017	2151	2284	2418	2551	2684	2818	2951	3084	133
6	3218	3351	3484	3617	3750	3883	4016	4149	4282	4415	133
7	4548	4681	4813	4946	5079	5211	5344	5476	5609	5741	133
8	5874	6006	6139	6271	6403	6535	6668	6800	6932	7064	132
9	7196	7328	7460	7592	7724	7855	7987	8119	8251	8382	132
330	518514	518646	518777	518909	519040	519171	519303	519434	519566	519697	131
1	9828	9959	520090	520221	520353	520484	520615	520745	520876	521007	131
2	521138	521269	1490	1530	1661	1792	1922	2053	2183	2314	131
3	2444	2575	2705	2835	2966	3096	3226	3356	3486	3616	130
4	3746	3876	4006	4136	4266	4396	4526	4656	4785	4915	130
5	5045	5174	5304	5434	5563	5693	5822	5951	6081	6210	129
6	6339	6469	6598	6727	6856	6985	7114	7243	7372	7501	129
7	7630	7759	7888	8016	8145	8274	8402	8531	8660	8788	129
8	8917	9045	9174	9302	9430	9559	9687	9815	9943	530072	128
9	530200	530328	530456	530584	530712	530840	530968	531096	531223	1351	128

No.	0	1	2	3	4	5	6	7	8	9	Diff.
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340	531479	531607	531734	531862	531990	532117	532245	532372	532500	532627	128
1	2754	2882	3009	3136	3264	3391	3518	3645	3772	3899	127
2	4026	4153	4280	4407	4534	4661	4787	4914	5041	5167	127
3	5294	5421	5547	5674	5800	5927	6053	6180	6306	6432	126
4	6558	6685	6811	6937	7063	7189	7315	7441	7567	7693	126
5	7819	7945	8071	8197	8322	8448	8574	8699	8825	8951	126
6	9076	9202	9327	9452	9578	9703	9829	9954	540079	540204	125
7	540329	540455	540580	540705	540830	540955	541080	541205	1330	1454	125
8	1579	1704	1829	1953	2078	2203	2327	2452	2576	2701	125
9	2825	2950	3074	3199	3323	3447	3571	3696	3820	3944	124
350	544068	544192	544316	544440	544564	544688	544812	544936	545060	545183	124
1	5307	5431	5555	5678	5802	5925	6049	6172	6296	6419	124
2	6543	6666	6789	6913	7036	7159	7282	7405	7529	7652	123
3	7775	7898	8021	8144	8267	8389	8512	8635	8758	8881	123
4	9003	9126	9249	9371	9494	9616	9739	9861	9984	550106	123
5	550228	550351	550473	550595	550717	550840	550962	551084	551206	1328	122
6	1450	1572	1694	1816	1938	2060	2181	2303	2425	2547	122
7	2668	2790	2911	3033	3155	3276	3398	3519	3640	3762	121
8	3883	4004	4126	4247	4368	4489	4610	4731	4852	4973	121
9	5094	5215	5336	5457	5578	5699	5820	5940	6061	6182	121
360	556303	556423	556544	556664	556785	556905	557026	557146	557267	557387	120
1	7507	7627	7748	7868	7988	8108	8228	8349	8469	8589	120
2	8709	8829	8948	9068	9188	9308	9428	9548	9667	9787	120
3	9907	560026	560146	560265	560385	560504	560624	560743	560863	560982	119
4	561101	1221	1340	1459	1578	1698	1817	1936	2055	2174	119
5	2293	2412	2531	2650	2769	2887	3006	3125	3244	3362	119
6	3481	3600	3718	3837	3955	4074	4192	4311	4429	4548	119
7	4666	4784	4903	5021	5139	5257	5376	5494	5612	5730	118
8	5848	5966	6084	6202	6320	6437	6555	6673	6791	6909	118
9	7026	7144	7262	7379	7497	7614	7732	7849	7967	8084	118
370	568202	568319	568436	568554	568671	568788	568905	569023	569140	569257	117
1	9374	9491	9608	9725	9842	9959	570076	570193	570309	570426	117
2	570543	570660	570776	570893	571010	571126	1243	1359	1476	1592	117
3	1709	1825	1942	2058	2174	2291	2407	2523	2639	2755	116
4	2872	2988	3104	3220	3336	3452	3568	3684	3800	3915	116
5	4031	4147	4263	4379	4494	4610	4726	4841	4957	5072	116
6	5188	5303	5419	5534	5650	5765	5880	5996	6111	6226	115
7	6341	6457	6572	6687	6802	6917	7032	7147	7262	7377	115
8	7492	7607	7722	7836	7951	8066	8181	8295	8410	8525	115
9	8639	8754	8868	8983	9097	9212	9326	9441	9555	9669	114
380	579784	579898	580012	580126	580241	580355	580469	580583	580697	580811	114
1	580925	581039	1153	1267	1381	1495	1608	1722	1836	1950	114
2	2063	2177	2291	2404	2518	2631	2745	2858	2972	3085	114
3	3199	3312	3426	3539	3652	3765	3879	3992	4105	4218	113
4	4331	4444	4557	4670	4783	4896	5009	5122	5235	5348	113
5	5461	5574	5686	5799	5912	6024	6137	6250	6362	6475	113
6	6587	6700	6812	6925	7037	7149	7262	7374	7486	7599	112
7	7711	7823	7935	8047	8160	8272	8384	8496	8608	8720	112
8	8832	8944	9056	9167	9279	9391	9503	9615	9726	9838	112
9	9950	590061	590173	590284	590396	590507	590619	590730	590842	590953	112
39	591065	591176	591287	591399	591510	591621	591732	591843	591955	592066	111
1	2177	2288	2399	2510	2621	2732	2843	2954	3064	3175	111
2	3286	3397	3508	3618	3729	3840	3950	4061	4171	4282	111
3	4393	4503	4614	4724	4834	4945	5055	5165	5276	5386	110
4	5496	5606	5717	5827	5937	6047	6157	6267	6377	6487	110
5	6597	6707	6817	6927	7037	7146	7256	7366	7476	7586	110
6	7695	7805	7914	8024	8134	8243	8353	8462	8572	8681	110
7	8791	8900	9009	9119	9228	9337	9446	9556	9665	9774	109
8	9883	9992	600101	600210	600319	600428	600537	600646	600755	600864	109
9	600973	601082	1191	1299	1408	1517	1625	1734	1843	1951	109

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No.	0	1	2	3	4	5	6	7	8	9	Diff.
400	602060	602169	602277	602386	602494	602603	602711	602819	602928	603036	108
1	3144	3253	3361	3469	3577	3686	3794	3902	4010	4118	108
2	4226	4334	4442	4550	4658	4766	4874	4982	5089	5197	108
3	5305	5413	5521	5628	5736	5844	5951	6059	6166	6274	108
4	6381	6489	6596	6704	6811	6919	7026	7133	7241	7348	107
5	7455	7562	7669	7777	7884	7991	8098	8205	8312	8419	107
6	8526	8633	8740	8847	8954	9061	9167	9274	9381	9488	107
7	9594	9701	9808	9914	610021	610128	610234	610341	610447	610554	107
8	610660	610767	610873	610979	1086	1192	1298	1405	1511	1617	106
9	1723	1829	1936	2042	2148	2254	2360	2466	2572	2678	106
410	612784	612890	612996	613102	613207	613313	613419	613525	613630	613736	106
1	3842	3947	4053	4159	4264	4370	4475	4581	4686	4792	106
2	4897	5003	5108	5213	5319	5424	5529	5634	5740	5845	105
3	5950	6055	6160	6265	6370	6476	6581	6686	6790	6895	105
4	7000	7105	7210	7315	7420	7525	7629	7734	7839	7943	105
5	8048	8153	8257	8362	8466	8571	8676	8780	8884	8989	105
6	9093	9198	9302	9406	9511	9615	9719	9824	9928	620032	104
7	620136	620240	620344	620448	620552	620656	620760	620864	620968	1072	104
8	1176	1280	1384	1488	1592	1695	1799	1903	2007	2110	104
9	2214	2318	2421	2525	2628	2732	2835	2939	3042	3146	104
420	623249	623353	623456	623559	623663	623766	623869	623973	624076	624179	103
1	4282	4385	4488	4591	4695	4798	4901	5004	5107	5210	103
2	5312	5415	5518	5621	5724	5827	5929	6032	6135	6238	103
3	6340	6443	6546	6648	6751	6853	6956	7058	7161	7263	103
4	7366	7468	7571	7673	7775	7878	7980	8082	8185	8287	102
5	8389	8491	8593	8695	8797	8900	9002	9104	9206	9308	102
6	9410	9512	9613	9715	9817	9919	630021	630123	630224	630326	102
7	630428	630530	630631	630733	630835	630936	1038	1139	1241	1342	102
8	1444	1545	1647	1748	1849	1951	2052	2153	2255	2356	101
9	2457	2559	2660	2761	2862	2963	3064	3165	3266	3367	101
430	633468	633569	633670	633771	633872	633973	634074	634175	634276	634376	101
1	4477	4578	4679	4779	4880	4981	5081	5182	5283	5383	101
2	5444	5544	5645	5745	5846	5946	6047	6147	6247	6348	100
3	6488	6588	6688	6789	6889	6989	7089	7189	7290	7390	100
4	7490	7590	7690	7790	7890	7990	8090	8190	8290	8389	100
5	8489	8589	8689	8789	8888	8988	9088	9188	9287	9387	100
6	9486	9586	9686	9785	9885	9984	640084	640183	640283	640382	99
7	640481	640581	640680	640779	640879	640978	1077	1177	1276	1375	99
8	1474	1573	1672	1771	1871	1970	2069	2168	2267	2366	99
9	2465	2563	2662	2761	2860	2959	3058	3156	3255	3354	99
440	643453	643551	643650	643749	643847	643946	644044	644143	644242	644340	98
1	4439	4537	4636	4734	4832	4931	5029	5127	5226	5324	98
2	5422	5521	5619	5717	5815	5913	6011	6110	6208	6306	98
3	6404	6502	6600	6698	6796	6894	6992	7089	7187	7285	98
4	7383	7481	7579	7676	7774	7872	7969	8067	8165	8262	98
5	8360	8458	8555	8653	8750	8848	8945	9043	9140	9237	97
6	9335	9432	9530	9627	9724	9821	9919	650016	650113	650210	97
7	650308	650405	650502	650599	650696	650793	650890	0987	1084	1181	97
8	1278	1375	1472	1569	1666	1762	1859	1956	2053	2150	97
9	2246	2343	2440	2536	2633	2730	2826	2923	3019	3116	97
450	653213	653309	653405	653502	653598	653695	653791	653888	653984	654080	96
1	4177	4273	4369	4465	4562	4658	4754	4850	4946	5042	96
2	5138	5235	5331	5427	5523	5619	5715	5810	5906	6002	96
3	6098	6194	6290	6386	6482	6577	6673	6769	6864	6960	96
4	7056	7152	7247	7343	7438	7534	7629	7725	7820	7916	96
5	8011	8107	8202	8298	8393	8488	8584	8679	8774	8870	95
6	8965	9060	9155	9250	9346	9441	9536	9631	9726	9821	95
7	9916	660011	660106	660201	660296	660391	660486	660581	660676	660771	95
8	660865	0960	1055	1150	1245	1339	1434	1529	1623	1718	95
9	1813	1907	2002	2096	2191	2286	2380	2475	2569	2663	95
No.	0	1	2	3	4	5	6	7	8	9	Diff.

No.	0	1	2	3	4	5	6	7	8	9	Diff.
460	662758	662852	662947	663041	663135	663230	663324	663418	663512	663607	94
1	3701	3795	3889	3983	4078	4172	4266	4360	4454	4548	94
2	4642	4736	4830	4924	5018	5112	5206	5299	5393	5487	94
3	5581	5675	5769	5862	5956	6050	6143	6237	6331	6424	94
4	6518	6612	6705	6799	6892	6986	7079	7173	7266	7360	94
5	7453	7546	7640	7733	7826	7920	8013	8106	8199	8293	93
6	8386	8479	8572	8665	8759	8852	8945	9038	9131	9224	93
7	9317	9410	9503	9596	9689	9782	9875	9967	670060	670153	93
8	670246	670339	670431	670524	670617	670710	670802	670895	0988	1680	93
9	1173	1265	1358	1451	1543	1636	1728	1821	1913	2005	93
470	672098	672190	672283	672375	672467	672560	672652	672744	672836	672929	92
1	3021	3113	3205	3297	3390	3482	3574	3666	3758	3850	92
2	3942	4034	4126	4218	4310	4402	4494	4586	4677	4769	92
3	4861	4953	5045	5137	5228	5320	5412	5503	5595	5687	92
4	5778	5870	5962	6053	6145	6236	6328	6419	6511	6602	92
5	6694	6785	6876	6968	7059	7151	7242	7333	7424	7516	91
6	7607	7698	7789	7881	7972	8063	8154	8245	8336	8427	91
7	8518	8609	8700	8791	8882	8973	9064	9155	9246	9337	91
8	9428	9519	9610	9700	9791	9882	9973	680063	680154	680245	91
9	680336	680426	680517	680607	680698	680789	680879	0970	1060	1151	91
480	681241	681332	681422	681513	681603	681693	681784	681874	681964	682055	90
1	2145	2235	2326	2416	2506	2596	2686	2777	2867	2957	90
2	3047	3137	3227	3317	3407	3497	3587	3677	3767	3857	90
3	3947	4037	4127	4217	4307	4396	4486	4576	4666	4756	90
4	4845	4935	5025	5114	5204	5294	5383	5473	5563	5652	90
5	5742	5831	5921	6010	6100	6189	6279	6368	6458	6547	89
6	6636	6726	6815	6904	6994	7083	7172	7261	7351	7440	89
7	7529	7618	7707	7796	7886	7975	8064	8153	8242	8331	89
8	8420	8509	8598	8687	8776	8865	8953	9042	9131	9220	89
9	9309	9398	9486	9575	9664	9753	9841	9930	690019	690107	89
490	690196	690285	690373	690462	690550	690639	690728	690816	690905	690993	89
1	1081	1170	1258	1347	1435	1524	1612	1700	1789	1877	88
2	1965	2053	2142	2230	2318	2406	2494	2582	2671	2759	88
3	2847	2935	3023	3111	3199	3287	3375	3463	3551	3639	88
4	3727	3815	3903	3991	4078	4166	4254	4342	4430	4517	88
5	4605	4693	4781	4868	4956	5044	5131	5219	5307	5394	88
6	5482	5569	5657	5744	5832	5919	6007	6094	6182	6269	87
7	6356	6444	6531	6618	6706	6793	6880	6968	7055	7142	87
8	7229	7317	7404	7491	7578	7665	7752	7839	7926	8014	87
9	8101	8188	8275	8362	8449	8535	8622	8709	8796	8883	87
500	698970	699057	699144	699231	699317	699404	699491	699578	699664	699751	87
1	9838	9924	700011	700098	700184	700271	700358	700444	700531	700617	87
2	700704	700790	0877	0963	1050	1136	1222	1309	1395	1482	86
3	1568	1654	1741	1827	1913	1999	2086	2172	2258	2344	86
4	2431	2517	2603	2689	2775	2861	2947	3033	3119	3205	86
5	3291	3377	3463	3549	3635	3721	3807	3893	3979	4065	86
6	4151	4236	4322	4408	4494	4579	4665	4751	4837	4922	86
7	5008	5094	5179	5265	5350	5436	5522	5607	5693	5778	86
8	5864	5949	6035	6120	6206	6291	6376	6462	6547	6632	85
9	6718	6803	6888	6974	7059	7144	7229	7315	7400	7485	85
510	707570	707655	707740	707826	707911	707996	708081	708166	708251	708336	85
1	8421	8506	8591	8676	8761	8846	8931	9015	9100	9185	85
2	9270	9355	9440	9524	9609	9694	9779	9863	9948	710033	85
3	710117	710202	710287	710371	710456	710540	710625	710710	710794	0879	85
4	0963	1048	1132	1217	1301	1385	1470	1554	1639	1723	84
5	1807	1892	1976	2060	2144	2229	2313	2397	2481	2566	84
6	2650	2734	2818	2902	2986	3070	3154	3238	3323	3407	84
7	3491	3575	3659	3742	3826	3910	3994	4078	4162	4246	84
8	4330	4414	4497	4581	4665	4749	4833	4916	5000	5084	84
9	5167	5251	5335	5418	5502	5586	5669	5753	5836	5920	84
No.	0	1	2	3	4	5	6	7	8	9	Diff.

No.	0	1	2	3	4	5	6	7	8	9	Diff.
520	716003	716087	716170	716254	716337	716421	716504	716588	716671	716754	83
1	6838	6921	7004	7088	7171	7254	7338	7421	7504	7587	83
2	7671	7754	7837	7920	8003	8086	8169	8253	8336	8419	83
3	8502	8585	8668	8751	8834	8917	9000	9083	9165	9248	83
4	9331	9414	9497	9580	9663	9745	9828	9911	9994	720077	83
5	720159	720242	720325	720407	720490	720573	720655	720738	720821	0903	83
6	0986	1068	1151	1233	1316	1398	1481	1563	1646	1728	82
7	1811	1893	1975	2058	2140	2222	2305	2387	2469	2552	82
8	2634	2716	2798	2881	2963	3045	3127	3209	3291	3374	82
9	3456	3538	3620	3702	3784	3866	3948	4030	4112	4194	82
530	724276	724358	724440	724522	724604	724685	724767	724849	724931	725013	82
1	5095	5176	5258	5340	5422	5503	5585	5667	5748	5830	82
2	5912	5993	6075	6156	6238	6320	6401	6483	6564	6646	82
3	6727	6809	6890	6972	7053	7134	7216	7297	7379	7460	81
4	7541	7623	7704	7785	7866	7948	8029	8110	8191	8273	81
5	8354	8435	8516	8597	8678	8759	8841	8922	9003	9084	81
6	9165	9246	9327	9408	9489	9570	9651	9732	9813	9893	81
7	9974	730055	730136	730217	730298	730378	730459	730540	730621	730702	81
8	730782	0863	0944	1024	1105	1186	1266	1347	1428	1508	81
9	1589	1669	1750	1830	1911	1991	2072	2152	2233	2313	81
540	732394	732474	732555	732635	732715	732796	732876	732956	733037	733117	80
1	3197	3278	3358	3438	3518	3598	3679	3759	3839	3919	80
2	3999	4079	4160	4240	4320	4400	4480	4560	4640	4720	80
3	4800	4880	4960	5040	5120	5200	5279	5359	5439	5519	80
4	5599	5679	5759	5838	5918	5998	6078	6157	6237	6317	80
5	6397	6476	6556	6635	6715	6795	6874	6954	7034	7113	80
6	7193	7272	7352	7431	7511	7590	7670	7749	7829	7908	79
7	7987	8067	8146	8225	8305	8384	8463	8543	8622	8701	79
8	8781	8860	8939	9018	9097	9177	9256	9335	9414	9493	79
9	9572	9651	9731	9810	9889	9968	740047	740126	740205	740284	79
550	740363	740442	740521	740600	740678	740757	740836	740915	740994	741073	79
1	1152	1230	1309	1388	1467	1546	1624	1703	1782	1860	79
2	1939	2018	2096	2175	2254	2332	2411	2489	2568	2647	79
3	2725	2804	2882	2961	3039	3118	3196	3275	3353	3431	78
4	3510	3588	3667	3745	3823	3902	3980	4058	4136	4215	78
5	4293	4371	4449	4528	4606	4684	4762	4840	4919	4997	78
6	5075	5153	5231	5309	5387	5465	5543	5621	5699	5777	78
7	5855	5933	6011	6089	6167	6245	6323	6401	6479	6556	78
8	6634	6712	6790	6868	6945	7023	7101	7179	7256	7334	78
9	7412	7489	7567	7645	7722	7800	7878	7955	8033	8110	78
560	748188	748266	748343	748421	748498	748576	748653	748731	748808	748885	77
1	8963	9040	9118	9195	9272	9350	9427	9504	9582	9659	77
2	9736	9814	9891	9968	750045	750123	750200	750277	750354	750431	77
3	750508	750586	750663	750740	0817	0894	0971	1048	1125	1202	77
4	1279	1356	1433	1510	1587	1664	1741	1818	1895	1972	77
5	2048	2125	2202	2279	2356	2433	2509	2586	2663	2740	77
6	2816	2893	2970	3047	3123	3200	3277	3353	3430	3506	77
7	3583	3660	3736	3813	3889	3966	4042	4119	4195	4272	77
8	4343	4425	4501	4578	4654	4730	4807	4883	4960	5036	76
9	5112	5189	5265	5341	5417	5494	5570	5646	5722	5799	76
570	755875	755951	756027	756103	756180	756256	756332	756408	756484	756560	76
1	6636	6712	6788	6864	6940	7016	7092	7168	7244	7320	76
2	7396	7472	7548	7624	7700	7775	7851	7927	8003	8079	76
3	8155	8230	8306	8382	8458	8533	8609	8685	8761	8836	76
4	8912	8988	9063	9139	9214	9290	9366	9441	9517	9592	76
5	9668	9743	9819	9894	9970	760045	760121	760196	760272	760347	75
6	760422	760498	760573	760649	760724	0799	0875	0950	1025	1101	75
7	1176	1251	1326	1402	1477	1552	1627	1702	1778	1853	75
8	1928	2003	2078	2153	2228	2303	2378	2453	2529	2604	75
9	2679	2754	2829	2904	2978	3053	3128	3203	3278	3353	75
No.	0	1	2	3	4	5	6	7	8	9	Diff.

No.	0	1	2	3	4	5	6	7	8	9	Diff.
580	763428	763503	763578	763653	763727	763802	763877	763952	764027	764101	75
1	4176	4251	4326	4400	4475	4550	4624	4699	4774	4848	75
2	4923	4998	5072	5147	5221	5296	5370	5445	5520	5594	75
3	5669	5743	5818	5892	5966	6041	6115	6190	6264	6338	74
4	6413	6487	6562	6636	6710	6785	6859	6933	7007	7082	74
5	7156	7230	7304	7379	7453	7527	7601	7675	7749	7823	74
6	7898	7972	8046	8120	8194	8268	8342	8416	8490	8564	74
7	8638	8712	8786	8860	8934	9008	9082	9156	9230	9303	74
8	9377	9451	9525	9599	9673	9746	9820	9894	9968	770042	74
9	770115	770189	770263	770336	770410	770484	770557	770631	770705	0778	74
590	770852	770926	770999	771073	771146	771220	771293	771367	771440	771514	74
1	1587	1661	1734	1808	1881	1955	2028	2102	2175	2248	73
2	2322	2395	2468	2542	2615	2688	2762	2835	2908	2981	73
3	3055	3128	3201	3274	3348	3421	3494	3567	3640	3713	73
4	3786	3860	3933	4006	4079	4152	4225	4298	4371	4444	73
5	4517	4590	4663	4736	4809	4882	4955	5028	5100	5173	73
6	5246	5319	5392	5465	5538	5610	5683	5756	5829	5902	73
7	5974	6047	6120	6193	6265	6338	6411	6483	6556	6629	73
8	6701	6774	6846	6919	6992	7064	7137	7209	7282	7354	73
9	7427	7499	7572	7644	7717	7789	7862	7934	8006	8079	72
600	778151	778224	778296	778368	778441	778513	778585	778658	778730	778802	72
1	8874	8947	9019	9091	9163	9236	9308	9380	9452	9524	72
2	9596	9669	9741	9813	9885	9957	780029	780101	780173	780245	72
3	780317	780389	780461	780533	780605	780677	0749	0821	0893	0965	72
4	1037	1109	1181	1253	1324	1396	1468	1540	1612	1684	72
5	1755	1827	1899	1971	2042	2114	2186	2258	2329	2401	72
6	2473	2544	2616	2688	2759	2831	2902	2974	3046	3117	72
7	3189	3260	3332	3403	3475	3546	3618	3689	3761	3832	71
8	3904	3975	4046	4118	4189	4261	4332	4403	4475	4546	71
9	4617	4689	4760	4831	4902	4974	5045	5116	5187	5259	71
610	785330	785401	785472	785542	785615	785686	785757	785828	785899	785970	71
1	6041	6112	6183	6254	6325	6396	6467	6538	6609	6680	71
2	6751	6822	6893	6964	7035	7106	7177	7248	7319	7390	71
3	7460	7531	7602	7673	7744	7815	7885	7956	8027	8098	71
4	8168	8239	8310	8381	8451	8522	8593	8663	8734	8804	71
5	8875	8946	9016	9087	9157	9228	9299	9369	9440	9510	71
6	9581	9651	9722	9792	9863	9933	790004	790074	790144	790215	70
7	790285	790356	790426	790496	790567	790637	0707	0778	0848	0918	70
8	0988	1059	1129	1199	1269	1340	1410	1480	1550	1620	70
9	1691	1761	1831	1901	1971	2041	2111	2181	2252	2322	70
620	792392	792462	792532	792602	792672	792742	792812	792882	792952	793022	70
1	3092	3162	3231	3301	3371	3441	3511	3581	3651	3721	70
2	3790	3860	3930	4000	4070	4139	42.9	4279	4349	4418	70
3	4488	4558	4627	4697	4767	4836	4906	4976	5045	5115	70
4	5185	5254	5324	5393	5463	5532	5602	5672	5741	5811	70
5	5880	5949	6019	6088	6158	6227	6297	6366	6436	6505	69
6	6574	6644	6713	6782	6852	6921	6990	7060	7129	7198	69
7	7268	7337	7406	7475	7545	7614	7683	7752	7821	7890	69
8	7960	8029	8098	8167	8236	8305	8374	8443	8513	8582	69
9	8651	8720	8789	8858	8927	8996	9065	9134	9203	9272	69
630	799341	799409	799478	799547	799616	799685	799754	799823	799892	799961	69
1	800029	800098	800167	800236	800305	800373	800442	800511	800580	800648	69
2	0717	0786	0854	0923	0992	1061	1129	1198	1266	1335	69
3	1404	1472	1541	1609	1678	1747	1815	1884	1952	2021	69
4	2089	2158	2226	2295	2363	2432	2500	2568	2637	2705	68
5	2774	2842	2910	2979	3047	3116	3184	3252	3321	3389	68
6	3457	3525	3594	3662	3730	3798	3867	3935	4003	4071	68
7	4139	4208	4276	4344	4412	4480	4548	4616	4685	4753	68
8	4821	4889	4957	5025	5093	5161	5229	5297	5365	5433	68
9	5501	5569	5637	5705	5773	5841	5908	5976	6044	6112	68
No.	0	1	2	3	4	5	6	7	8	9	Diff.

No.	0	1	2	3	4	5	6	7	8	9	Diff.
640	806180	806248	806316	806384	806451	806519	806587	806655	806723	806790	68
1	6858	6926	6994	7061	7129	7197	7264	7332	7400	7467	68
2	7535	7603	7670	7738	7806	7873	7941	8008	8076	8143	68
3	8211	8279	8346	8414	8481	8549	8616	8684	8751	8818	67
4	8886	8953	9021	9088	9156	9223	9290	9358	9425	9492	67
5	9560	9627	9694	9762	9829	9896	9964	810031	810098	810165	67
6	810233	810300	810367	810434	810501	810569	810636	0703	0770	0837	67
7	0904	0971	1039	1106	1173	1240	1307	1374	1441	1508	67
8	1575	1642	1709	1776	1843	1910	1977	2044	2111	2178	67
9	2245	2312	2379	2445	2512	2579	2646	2713	2780	2847	67
650	812913	812980	813047	813114	813181	813247	813314	813381	813448	813514	67
1	3581	3648	3714	3781	3848	3914	3981	4048	4114	4181	67
2	4248	4314	4381	4447	4514	4581	4647	4714	4780	4847	67
3	4913	4980	5046	5113	5179	5246	5312	5378	5445	5511	66
4	5578	5644	5711	5777	5843	5910	5976	6042	6109	6175	66
5	6241	6308	6374	6440	6506	6573	6639	6705	6771	6838	66
6	6904	6970	7036	7102	7169	7235	7301	7367	7433	7499	66
7	7565	7631	7698	7764	7830	7896	7962	8028	8094	8160	66
8	8226	8292	8358	8424	8490	8556	8622	8688	8754	8820	66
9	8885	8951	9017	9083	9149	9215	9281	9346	9412	9478	66
660	819544	819610	819676	819741	819807	819873	819939	820004	820070	820136	66
1	820201	820267	820333	820399	820464	820530	820595	0661	0727	0792	66
2	0858	0924	0989	1055	1120	1186	1251	1317	1382	1448	66
3	1514	1579	1645	1710	1775	1841	1906	1972	2037	2103	65
4	2168	2233	2299	2364	2430	2495	2560	2626	2691	2756	65
5	2822	2887	2952	3018	3083	3148	3213	3279	3344	3409	65
6	3474	3539	3605	3670	3735	3800	3865	3930	3996	4061	65
7	4126	4191	4256	4321	4386	4451	4516	4581	4646	4711	65
8	4776	4841	4906	4971	5036	5101	5166	5231	5296	5361	65
9	5426	5491	5556	5621	5686	5751	5815	5880	5945	6010	65
670	826075	826140	826204	826269	826334	826399	826464	826528	826593	826658	65
1	6723	6787	6852	6917	6981	7046	7111	7175	7240	7305	65
2	7369	7434	7499	7563	7628	7692	7757	7821	7886	7951	65
3	8015	8080	8144	8209	8273	8338	8402	8467	8531	8595	64
4	8660	8724	8789	8853	8918	8982	9046	9111	9175	9239	64
5	9304	9368	9432	9497	9561	9625	9690	9754	9818	9882	64
6	9947	830011	830075	830139	830204	830268	830332	830396	830460	830525	64
7	830589	0653	0717	0781	0845	0909	0973	1037	1102	1166	64
8	1230	1294	1358	1422	1486	1550	1614	1678	1742	1806	64
9	1870	1934	1998	2062	2126	2189	2253	2317	2381	2445	64
680	832509	832573	832637	832700	832764	832828	832892	832956	833020	833083	64
1	3147	3211	3275	3338	3402	3466	3530	3593	3657	3721	64
2	3784	3848	3912	3975	4039	4103	4166	4230	4294	4357	64
3	4421	4484	4548	4611	4675	4739	4802	4866	4929	4993	64
4	5056	5120	5183	5247	5310	5373	5437	5500	5564	5627	63
5	5691	5754	5817	5881	5944	6007	6071	6134	6197	6261	63
6	6324	6387	6451	6514	6577	6641	6704	6767	6830	6894	63
7	6957	7020	7083	7146	7210	7273	7336	7399	7462	7525	63
8	7588	7652	7715	7778	7841	7904	7967	8030	8093	8156	63
9	8219	8282	8345	8408	8471	8534	8597	8660	8723	8786	63
690	838849	838912	838975	839038	839101	839164	839227	839289	839352	839415	63
1	9478	9541	9604	9667	9729	9792	9855	9918	9981	840043	63
2	840106	840169	840232	840294	840357	840420	840482	840545	840608	0671	63
3	0733	0796	0859	0921	0984	1046	1109	1172	1234	1297	63
4	1359	1422	1485	1547	1610	1672	1735	1797	1860	1922	63
5	1985	2047	2110	2172	2235	2297	2360	2422	2484	2547	62
6	2609	2672	2734	2796	2859	2921	2983	3046	3108	3170	62
7	3233	3295	3357	3420	3482	3544	3606	3669	3731	3793	62
8	3855	3918	3980	4042	4104	4166	4229	4291	4353	4415	62
9	4477	4539	4601	4664	4726	4788	4850	4912	4974	5036	62

No.	0	1	2	3	4	5	6	7	8	9	Diff.
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No.	0	1	2	3	4	5	6	7	8	9	Diff.
700	845098	845160	845222	845284	845346	845408	845470	845532	845594	845656	62
1	5718	5780	5842	5904	5966	6028	6090	6151	6213	6275	62
2	6337	6399	6461	6523	6585	6646	6708	6770	6832	6894	62
3	6955	7017	7079	7141	7202	7264	7326	7388	7449	7511	62
4	7573	7634	7696	7758	7819	7881	7943	8004	8066	8128	62
5	8189	8251	8312	8374	8435	8497	8559	8620	8682	8743	62
6	8805	8866	8928	8989	9051	9112	9174	9235	9297	9358	61
7	9419	9481	9542	9604	9665	9726	9788	9849	9911	9972	61
8	850033	850095	850156	850217	850279	850340	850401	850462	850524	850585	61
9	0646	0707	0769	0830	0891	0952	1014	1075	1136	1197	61
710	851258	851320	851381	851442	851503	851564	851625	851686	851747	851809	61
1	1870	1931	1992	2053	2114	2175	2236	2297	2358	2419	61
2	2480	2541	2602	2663	2724	2785	2846	2907	2968	3029	61
3	3090	3150	3211	3272	3333	3394	3455	3516	3577	3637	61
4	3698	3759	3820	3881	3941	4002	4063	4124	4185	4245	61
5	4306	4367	4428	4488	4549	4610	4670	4731	4792	4852	61
6	4913	4974	5034	5095	5156	5216	5277	5337	5398	5459	61
7	5519	5580	5640	5701	5761	5822	5882	5943	6003	6064	61
8	6124	6185	6245	6306	6366	6427	6487	6548	6608	6668	60
9	6729	6789	6850	6910	6970	7031	7091	7152	7212	7272	60
720	857332	857393	857453	857513	857574	857634	857694	857755	857815	857875	60
1	7935	7995	8056	8116	8176	8236	8297	8357	8417	8477	60
2	8537	8597	8657	8718	8778	8838	8898	8958	9018	9078	60
3	9138	9198	9258	9318	9379	9439	9499	9559	9619	9679	60
4	9739	9799	9859	9918	9978	860038	860098	860158	860218	860278	60
5	860338	860398	860458	860518	860578	0637	0697	0757	0817	0877	60
6	0937	0996	1056	1116	1176	1236	1295	1355	1415	1475	60
7	1534	1594	1654	1714	1773	1833	1893	1952	2012	2072	60
8	2131	2191	2251	2310	2370	2430	2489	2549	2608	2668	60
9	2728	2787	2847	2906	2966	3025	3085	3144	3204	3263	60
730	863323	863382	863442	863501	863561	863620	863680	863739	863799	863858	59
1	3917	3977	4036	4096	4155	4214	4274	4333	4392	4452	59
2	4511	4570	4630	4689	4748	4808	4867	4926	4985	5045	59
3	5104	5163	5222	5282	5341	5400	5459	5519	5578	5637	59
4	5696	5755	5814	5874	5933	5992	6051	6110	6169	6228	59
5	6287	6346	6405	6465	6524	6583	6642	6701	6760	6819	59
6	6878	6937	6996	7055	7114	7173	7232	7291	7350	7409	59
7	7467	7526	7585	7644	7703	7762	7821	7880	7939	7998	59
8	8056	8115	8174	8233	8292	8350	8409	8468	8527	8586	59
9	8644	8703	8762	8821	8879	8938	8997	9056	9114	9173	59
740	869232	869290	869349	869408	869466	869525	869584	869642	869701	869760	59
1	9818	9877	9935	9994	870053	970111	870170	870228	870287	870345	59
2	870404	870462	870521	870579	0638	0696	0755	0813	0872	0930	58
3	0989	1047	1106	1164	1223	1281	1339	1398	1456	1515	58
4	1573	1631	1690	1748	1806	1865	1923	1981	2040	2098	58
5	2156	2215	2273	2331	2389	2448	2506	2564	2622	2681	58
6	2739	2797	2855	2913	2972	3030	3088	3146	3204	3262	58
7	3321	3379	3437	3495	3553	3611	3669	3727	3785	3844	58
8	3902	3960	4018	4076	4134	4192	4250	4308	4366	4424	58
9	4482	4540	4598	4656	4714	4772	4830	4888	4945	5003	58
750	875061	875119	875177	875235	875293	875351	875409	875466	875524	875582	58
1	5640	5698	5756	5813	5871	5929	5987	6045	6102	6160	58
2	6218	6276	6333	6391	6449	6507	6564	6622	6680	6737	58
3	6795	6853	6910	6968	7026	7083	7141	7199	7256	7314	58
4	7371	7429	7487	7544	7602	7659	7717	7774	7832	7889	58
5	7947	8004	8062	8119	8177	8234	8292	8349	8407	8464	57
6	8522	8579	8637	8694	8752	8809	8866	8924	8981	9039	57
7	9096	9153	9211	9268	9325	9383	9440	9497	9555	9612	57
8	9669	9726	9784	9841	9898	9956	880013	880070	880127	880185	57
9	880242	880299	880356	880413	880471	880528	0585	0642	0699	0756	57
No.	0	1	2	3	4	5	6	7	8	9	Diff.

No.	0	1	2	3	4	5	6	7	8	9	Diff.
760	880814	880871	880928	880985	881042	881099	881156	881213	881271	881328	57
1	1385	1442	1499	1556	1613	1670	1727	1784	1841	1898	57
2	1955	2012	2069	2126	2183	2240	2297	2354	2411	2468	57
3	2525	2581	2638	2695	2752	2809	2866	2923	2980	3037	57
4	3093	3150	3207	3264	3321	3377	3434	3491	3548	3605	57
5	3661	3718	3775	3832	3888	3945	4002	4059	4115	4172	57
6	4229	4285	4342	4399	4455	4512	4569	4625	4682	4739	57
7	4795	4852	4909	4965	5022	5078	5135	5192	5248	5305	57
8	5361	5418	5474	5531	5587	5644	5700	5757	5813	5870	57
9	5926	5983	6039	6096	6152	6209	6265	6321	6378	6434	56
770	886491	886547	886604	886660	886716	886773	886829	886885	886942	886998	56
1	7054	7111	7167	7223	7280	7336	7392	7449	7505	7561	56
2	7617	7674	7730	7786	7842	7898	7955	8011	8067	8123	56
3	8179	8236	8292	8348	8404	8460	8516	8573	8629	8685	56
4	8741	8797	8853	8909	8965	9021	9077	9134	9190	9246	56
5	9302	9358	9414	9470	9526	9582	9638	9694	9750	9806	56
6	9862	9918	9974	890030	890086	890141	890197	890253	890309	890365	56
7	890421	890477	890533	0589	0645	0700	0756	0812	0868	0924	56
8	0980	1035	1091	1147	1203	1259	1314	1370	1426	1482	56
9	1537	1593	1649	1705	1760	1816	1872	1928	1983	2039	56
780	892095	892150	892206	892262	892317	892373	892429	892484	892540	892595	56
1	2651	2707	2762	2818	2873	2929	2985	3040	3096	3151	56
2	3207	3262	3318	3373	3429	3484	3540	3595	3651	3706	56
3	3762	3817	3873	3928	3984	4039	4094	4150	4205	4261	55
4	4316	4371	4427	4482	4538	4593	4648	4704	4759	4814	55
5	4870	4925	4980	5036	5091	5146	5201	5257	5312	5367	55
6	5423	5478	5533	5588	5644	5699	5754	5809	5864	5920	55
7	5975	6030	6085	6140	6195	6251	6306	6361	6416	6471	55
8	6526	6581	6636	6692	6747	6802	6857	6912	6967	7022	55
9	7077	7132	7187	7242	7297	7352	7407	7462	7517	7572	55
790	897627	897682	897737	897792	897847	897902	897957	898012	898067	898122	55
1	8176	8231	8286	8341	8396	8451	8506	8561	8615	8670	55
2	8725	8780	8835	8890	8944	8999	9054	9109	9164	9218	55
3	9273	9328	9383	9437	9492	9547	9602	9656	9711	9766	55
4	9821	9875	9930	9985	900039	900094	900149	900203	900258	900312	55
5	900367	900422	900476	900531	0586	0640	0695	0749	0804	0859	55
6	0913	0968	1022	1077	1131	1186	1240	1295	1349	1404	55
7	1458	1513	1567	1622	1676	1731	1785	1840	1894	1948	54
8	2003	2057	2112	2166	2221	2275	2329	2384	2438	2492	54
9	2547	2601	2655	2710	2764	2818	2873	2927	2981	3036	54
800	903090	903144	903199	903253	903307	903361	903416	903470	903524	903578	54
1	3633	3687	3741	3795	3849	3904	3958	4012	4066	4120	54
2	4174	4229	4283	4337	4391	4445	4499	4553	4607	4661	54
3	4716	4770	4824	4878	4932	4986	5040	5094	5148	5202	54
4	5256	5310	5364	5418	5472	5526	5580	5634	5688	5742	54
5	5796	5850	5904	5958	6012	6066	6119	6173	6227	6281	54
6	6335	6389	6443	6497	6551	6604	6658	6712	6766	6820	54
7	6874	6927	6981	7035	7089	7143	7196	7250	7304	7358	54
8	7411	7465	7519	7573	7626	7680	7734	7787	7841	7895	54
9	7949	8002	8056	8110	8163	8217	8270	8324	8378	8431	54
810	908485	908539	908592	908646	908699	908753	908807	908860	908914	908967	54
1	9021	9074	9128	9181	9235	9289	9342	9396	9449	9503	54
2	9556	9610	9663	9716	9770	9823	9877	9930	9984	910037	53
3	910091	910144	910197	910251	910304	910358	910411	910464	910518	0571	53
4	0624	0678	0731	0784	0838	0891	0944	0998	1051	1104	53
5	1158	1211	1264	1317	1371	1424	1477	1530	1584	1637	53
6	1690	1743	1797	1850	1903	1956	2009	2063	2116	2169	53
7	2222	2275	2328	2381	2435	2488	2541	2594	2647	2700	53
8	2753	2806	2859	2913	2966	3019	3072	3125	3178	3231	53
9	3284	3337	3390	3443	3496	3549	3602	3655	3708	3761	53
No.	0	1	2	3	4	5	6	7	8	9	Diff.

No.	0	1	2	3	4	5	6	7	8	9	Diff.
820	913814	913867	913920	913973	914026	914079	914132	914184	914237	914290	53
1	4343	4396	4449	4502	4555	4608	4660	4713	4766	4819	53
2	4872	4925	4977	5030	5083	5136	5189	5241	5294	5347	53
3	5400	5453	5505	5558	5611	5664	5716	5769	5822	5875	53
4	5927	5980	6033	6085	6138	6191	6243	6296	6349	6401	53
5	6454	6507	6559	6612	6664	6717	6770	6822	6875	6927	53
6	6980	7033	7085	7138	7190	7243	7295	7348	7400	7453	53
7	7506	7558	7611	7663	7716	7768	7820	7873	7925	7978	52
8	8030	8083	8135	8188	8240	8293	8345	8397	8450	8502	52
9	8555	8607	8659	8712	8764	8816	8869	8921	8973	9026	52
830	919078	919130	919183	919235	919287	919340	919392	919444	919496	919549	52
1	9601	9653	9706	9758	9810	9862	9914	9967	920019	920071	52
2	920123	920176	920228	920280	920332	920384	920436	920489	0541	0593	52
3	0645	0697	0749	0801	0853	0906	0958	1010	1062	1114	52
4	1166	1218	1270	1322	1374	1426	1478	1530	1582	1634	52
5	1686	1738	1790	1842	1894	1946	1998	2050	2102	2154	52
6	2206	2258	2310	2362	2414	2466	2518	2570	2622	2674	52
7	2725	2777	2829	2881	2933	2985	3037	3089	3140	3192	52
8	3244	3296	3348	3399	3451	3503	3555	3607	3658	3710	52
9	3762	3814	3865	3917	3969	4021	4072	4124	4176	4228	52
840	924279	924331	924383	924434	924486	924538	924589	924641	924693	924744	52
1	4796	4848	4899	4951	5003	5054	5106	5157	5209	5261	52
2	5312	5364	5415	5467	5518	5570	5621	5673	5725	5776	52
3	5828	5879	5931	5982	6034	6085	6137	6188	6240	6291	51
4	6342	6394	6445	6497	6548	6600	6651	6702	6754	6805	51
5	6857	6908	6959	7011	7062	7114	7165	7216	7268	7319	51
6	7370	7422	7473	7524	7576	7627	7678	7730	7781	7832	51
7	7883	7935	7986	8037	8088	8140	8191	8242	8293	8345	51
8	8396	8447	8498	8549	8601	8652	8703	8754	8805	8857	51
9	8908	8959	9010	9061	9112	9163	9215	9266	9317	9368	51
850	929419	929470	929521	929572	929623	929674	929725	929776	929827	929879	51
1	9930	9981	930032	930083	930134	930185	930236	930287	930338	930389	51
2	930440	930491	0542	0592	0643	0694	0745	0796	0847	0898	51
3	0949	1000	1051	1102	1153	1204	1254	1305	1356	1407	51
4	1458	1509	1560	1610	1661	1712	1763	1814	1865	1915	51
5	1966	2017	2068	2118	2169	2220	2271	2322	2372	2423	51
6	2474	2524	2575	2626	2677	2727	2778	2829	2879	2930	51
7	2981	3031	3082	3133	3183	3234	3285	3335	3386	3437	51
8	3487	3538	3589	3639	3690	3740	3791	3841	3892	3943	51
9	3993	4044	4094	4145	4195	4246	4296	4347	4397	4448	51
860	934498	934549	934599	934650	934700	934751	934801	934852	934902	934953	50
1	5003	5054	5104	5154	5205	5255	5306	5356	5406	5457	50
2	5507	5558	5608	5658	5709	5759	5809	5860	5910	5960	50
3	6011	6061	6111	6162	6212	6262	6313	6363	6413	6463	50
4	6514	6564	6614	6665	6715	6765	6815	6865	6916	6966	50
5	7016	7066	7117	7167	7217	7267	7317	7367	7418	7468	50
6	7518	7568	7618	7668	7718	7769	7819	7869	7919	7969	50
7	8019	8069	8119	8169	8219	8269	8320	8370	8420	8470	50
8	8520	8570	8620	8670	8720	8770	8820	8870	8920	8970	50
9	9020	9070	9120	8170	9230	9270	9320	9369	9419	9469	50
870	939519	939569	939619	939669	939719	939769	939819	939869	939918	939968	50
1	940018	940068	940118	940168	940218	940267	940317	940367	940417	940467	50
2	0516	0566	0616	0666	0716	0765	0815	0865	0915	0964	50
3	1014	1064	1114	1163	1213	1263	1313	1362	1412	1462	50
4	1511	1561	1611	1660	1710	1760	1809	1859	1909	1958	50
5	2008	2058	2107	2157	2207	2256	2306	2355	2405	2455	50
6	2504	2554	2603	2653	2702	2752	2801	2851	2901	2950	50
7	3000	3049	3099	3148	3198	3247	3297	3346	3396	3445	49
8	3495	3544	3593	3643	3692	3742	3791	3841	3890	3939	49
9	3989	4038	4088	4137	4186	4236	4285	4335	4384	4433	49
No.	0	1	2	3	4	5	6	7	8	9	Diff.

No.	0	1	2	3	4	5	6	7	8	9	Diff.
880	944483	944532	944581	944631	944680	944729	944779	944828	944877	944927	49
1	4976	5025	5074	5124	5173	5222	5272	5321	5370	5419	49
2	5469	5518	5567	5616	5665	5715	5764	5813	5862	5912	49
3	5961	6010	6059	6108	6157	6207	6256	6305	6354	6403	49
4	6452	6501	6551	6600	6649	6698	6747	6796	6845	6894	49
5	6943	6992	7041	7090	7140	7189	7238	7287	7336	7385	49
6	7434	7483	7532	7581	7630	7679	7728	7777	7826	7875	49
7	7924	7973	8022	8070	8119	8168	8217	8266	8315	8364	49
8	8413	8462	8511	8560	8609	8657	8706	8755	8804	8853	49
9	8902	8951	8999	9048	9097	9146	9195	9244	9292	9341	49
890	949390	949439	949488	949536	949585	949634	949683	949731	949780	949829	49
1	9878	9926	9975	950024	950073	950121	950170	950219	950267	950316	49
2	950365	950414	950462	0511	0560	0608	0657	0706	0754	0803	49
3	0851	0900	0949	0997	1046	1095	1143	1192	1240	1289	49
4	1338	1386	1435	1483	1532	1580	1629	1677	1726	1775	49
5	1823	1872	1920	1969	2017	2066	2114	2163	2211	2260	48
6	2308	2356	2405	2453	2502	2550	2599	2647	2696	2744	48
7	2792	2841	2889	2938	2986	3034	3083	3131	3180	3228	48
8	3276	3325	3373	3421	3470	3518	3566	3615	3663	3711	48
9	3760	3808	3856	3905	3953	4001	4049	4098	4146	4194	48
900	954243	954291	954339	954387	954435	954484	954532	954580	954628	954677	48
1	4725	4773	4821	4869	4918	4966	5014	5062	5110	5158	48
2	5207	5255	5303	5351	5399	5447	5495	5543	5592	5640	48
3	5688	5736	5784	5832	5880	5928	5976	6024	6072	6120	48
4	6168	6216	6265	6313	6361	6409	6457	6505	6553	6601	48
5	6649	6697	6745	6793	6840	6888	6936	6984	7032	7080	48
6	7128	7176	7224	7272	7320	7368	7416	7464	7512	7559	48
7	7607	7655	7703	7751	7799	7847	7894	7942	7990	8038	48
8	8086	8134	8181	8229	8277	8325	8373	8421	8468	8516	48
9	8564	8612	8659	8707	8755	8803	8850	8898	8946	8994	48
910	959041	959089	959137	959185	959232	959280	959328	959375	959423	959471	48
1	9518	9566	9614	9661	9709	9757	9804	9852	9900	9947	48
2	9995	960042	960090	960138	960185	960233	960281	960328	960376	960423	48
3	960471	0518	0566	0613	0661	0709	0756	0804	0851	0899	48
4	0946	0994	1041	1089	1136	1184	1231	1279	1326	1374	48
5	1421	1469	1516	1563	1611	1658	1706	1753	1801	1848	47
6	1895	1943	1990	2038	2085	2132	2180	2227	2275	2322	47
7	2369	2417	2464	2511	2559	2606	2653	2701	2748	2795	47
8	2843	2890	2937	2985	3032	3079	3126	3174	3221	3268	47
9	3316	3363	3410	3457	3504	3552	3599	3646	3693	3741	47
920	963788	963835	963882	963929	963977	964024	964071	964118	964165	964212	47
1	4260	4307	4354	4401	4448	4495	4542	4590	4637	4684	47
2	4731	4778	4825	4872	4919	4966	5013	5061	5108	5155	47
3	5202	5249	5296	5343	5390	5437	5484	5531	5578	5625	47
4	5672	5719	5766	5813	5860	5907	5954	6001	6048	6095	47
5	6142	6189	6236	6283	6329	6376	6423	6470	6517	6564	47
6	6611	6658	6705	6752	6799	6845	6892	6939	6986	7033	47
7	7080	7127	7173	7220	7267	7314	7361	7408	7454	7501	47
8	7548	7595	7642	7688	7735	7782	7829	7875	7922	7969	47
9	8016	8062	8109	8156	8203	8249	8296	8343	8390	8436	47
930	968483	968530	968576	968623	968670	968716	968763	968810	968856	968903	47
1	8950	8996	9043	9090	9136	9183	9229	9276	9323	9369	47
2	9416	9463	9509	9556	9602	9649	9695	9742	9789	9835	47
3	9882	9928	9975	970021	970068	970114	970161	970207	970254	970300	47
4	970347	970393	970440	0486	0533	0579	0626	0672	0719	0765	46
5	0812	0858	0904	0951	0997	1044	1090	1137	1183	1229	46
6	1276	1322	1369	1415	1461	1508	1554	1601	1647	1693	46
7	1740	1786	1832	1879	1925	1971	2018	2064	2110	2157	46
8	2203	2249	2295	2342	2388	2434	2481	2527	2573	2619	46
9	2666	2712	2758	2804	2851	2897	2943	2989	3035	3082	46
No.	0	1	2	3	4	5	6	7	8	9	Diff.

No.	0	1	2	3	4	5	6	7	8	9	Diff.
940	973128	973174	973220	973266	973313	973359	973405	973451	973497	973543	46
1	3590	3636	3682	3728	3774	3820	3866	3913	3959	4005	46
2	4051	4097	4143	4189	4235	4281	4327	4374	4420	4466	46
3	4512	4558	4604	4650	4696	4742	4788	4834	4880	4926	46
4	4972	5018	5064	5110	5156	5202	5248	5294	5340	5386	46
5	5432	5478	5524	5570	5616	5662	5707	5753	5799	5845	46
6	5891	5937	5983	6029	6075	6121	6167	6212	6258	6304	46
7	6350	6396	6442	6488	6533	6579	6625	6671	6717	6763	46
8	6808	6854	6900	6946	6992	7037	7083	7129	7175	7220	46
9	7266	7312	7358	7403	7449	7495	7541	7586	7632	7678	46
950	977724	977769	977815	977861	977906	977952	977998	978043	978089	978135	46
1	8181	8226	8272	8317	8363	8409	8454	8500	8546	8591	46
2	8637	8683	8728	8774	8819	8865	8911	8956	9002	9047	46
3	9093	9138	9184	9230	9275	9321	9366	9412	9457	9503	46
4	9548	9594	9639	9685	9730	9776	9821	9867	9912	9958	46
5	980003	980049	980094	980140	980185	980231	980276	980322	980367	980412	45
6	0458	0503	0549	0594	0640	0685	0730	0776	0821	0867	45
7	0912	0957	1003	1048	1093	1139	1184	1229	1275	1320	45
8	1366	1411	1456	1501	1547	1592	1637	1683	1728	1773	45
9	1819	1864	1909	1954	2000	2045	2090	2135	2181	2226	45
960	982271	982316	982362	982407	982452	982497	982543	982588	982633	982678	45
1	2723	2769	2814	2859	2904	2949	2994	3040	3085	3130	45
2	3175	3220	3265	3310	3356	3401	3446	3491	3536	3581	45
3	3626	3671	3716	3762	3807	3852	3897	3942	3987	4032	45
4	4077	4122	4167	4212	4257	4302	4347	4392	4437	4482	45
5	4527	4572	4617	4662	4707	4752	4797	4842	4887	4932	45
6	4977	5022	5067	5112	5157	5202	5247	5292	5337	5382	45
7	5426	5471	5516	5561	5606	5651	5696	5741	5786	5830	45
8	5875	5920	5965	6010	6055	6100	6144	6189	6234	6279	45
9	6324	6369	6413	6458	6503	6548	6593	6637	6682	6727	45
970	986772	986817	986861	986906	986951	986996	987040	987085	987130	987175	45
1	7219	7264	7309	7353	7398	7443	7488	7532	7577	7622	45
2	7666	7711	7756	7800	7845	7890	7934	7979	8024	8068	45
3	8113	8157	8202	8247	8291	8336	8381	8425	8470	8514	45
4	8559	8604	8648	8693	8737	8782	8826	8871	8916	8960	45
5	9005	9049	9094	9138	9183	9227	9272	9316	9361	9405	45
6	9450	9494	9539	9583	9628	9672	9717	9761	9806	9850	44
7	9895	9939	9983	990028	990072	990117	990161	990206	990250	990294	44
8	990339	990383	990428	0472	0516	0561	0605	0650	0694	0738	44
9	0783	0827	0871	0916	0960	1004	1049	1093	1137	1182	44
980	991226	991270	991315	991359	991403	991448	991492	991536	991580	991625	44
1	1669	1713	1758	1802	1846	1890	1935	1979	2023	2067	44
2	2111	2156	2200	2244	2288	2333	2377	2421	2465	2509	44
3	2554	2598	2642	2686	2730	2774	2819	2863	2907	2951	44
4	2995	3039	3083	3127	3172	3216	3260	3304	3348	3392	44
5	3436	3480	3524	3568	3613	3657	3701	3745	3789	3833	44
6	3877	3921	3965	4009	4053	4097	4141	4185	4229	4273	44
7	4317	4361	4405	4449	4493	4537	4581	4625	4669	4713	44
8	4757	4801	4845	4889	4933	4977	5021	5065	5108	5152	44
9	5196	5240	5284	5328	5372	5416	5460	5504	5547	5591	44
990	995635	995679	995723	995767	995811	995854	995898	995942	995986	996030	44
1	6074	6117	6161	6205	6249	6293	6337	6380	6424	6468	44
2	6512	6555	6599	6643	6687	6731	6774	6818	6862	6906	44
3	6949	6993	7037	7080	7124	7168	7212	7255	7299	7343	44
4	7386	7430	7474	7517	7561	7605	7648	7692	7736	7779	44
5	7823	7867	7910	7954	7998	8041	8085	8129	8172	8216	44
6	8259	8303	8347	8390	8434	8477	8521	8564	8608	8652	44
7	8695	8739	8782	8826	8869	8913	8956	9000	9043	9087	44
8	9131	9174	9218	9261	9305	9348	9392	9435	9479	9522	44
9	9565	9609	9652	9696	9739	9783	9826	9870	9913	9957	43

No.	0	1	2	3	4	5	6	7	8	9	Diff.
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TABLE FOR REDUCING COMMON TO HYPERBOLIC LOGARITHMS.

Com. Log.	Hyperb. Log.	Com. Log.	Hyperb. Log.	Com. Log.	Hyperb. Log.	Com. Log.	Hyperb. Log.	Com. Log.	Hyperb. Log.
·01	·02302585	·21	·48354287	·41	·94465989	·61	1·40457691	·81	1·86509393
·02	·04605170	·22	·50656572	·42	·96708574	·62	1·42760276	·82	1·88811978
·03	·06907755	·23	·52959457	·43	·99011159	·63	1·45062861	·83	1·91114563
·04	·09210340	·24	·55262042	·44	1·01313744	·64	1·47365440	·84	1·93417148
·05	·11512925	·25	·57564627	·45	1·03616329	·65	1·49668031	·85	1·95719733
·06	·13815511	·26	·59867212	·46	1·05918914	·66	1·51970616	·86	1·98022318
·07	·16118096	·27	·62169798	·47	1·08221499	·67	1·54273201	·87	2·00324903
·08	·18420681	·28	·64472383	·48	1·10524084	·68	1·56575780	·88	2·02627488
·09	·20723266	·29	·66774968	·49	1·12826570	·69	1·58878371	·89	2·04930073
·10	·23025851	·30	·69077553	·50	1·15129255	·70	1·61180953	·90	2·07232658
·11	·25328436	·31	·71380138	·51	1·17431840	·71	1·63483542	·91	2·09535243
·12	·27631021	·32	·73682723	·52	1·19734425	·72	1·65786127	·92	2·11837829
·13	·29933606	·33	·75985308	·53	1·22037010	·73	1·68088712	·93	2·14140414
·14	·32236191	·34	·78287893	·54	1·24339595	·74	1·70391297	·94	2·16442999
·15	·34538776	·35	·80590478	·55	1·26642180	·75	1·72693882	·95	2·18745584
·16	·36841361	·36	·82893063	·56	1·28944765	·76	1·74996467	·96	2·21048169
·17	·39143946	·37	·85195648	·57	1·31247350	·77	1·77299052	·97	2·23350754
·18	·41446532	·38	·87498234	·58	1·33549935	·78	1·79601637	·98	2·25653339
·19	·43749117	·39	·89800819	·59	1·35852520	·79	1·81904222	·99	2·27955924
·20	·46051702	·40	·92103404	·60	1·38155106	·80	1·84206807	1·00	2·30258509

TABLE OF THE GEOGRAPHICAL MILES IN A DEGREE OF LONGITUDE AT EVERY DEGREE OF LATITUDE ON THE TERRESTRIAL SPHEROID, THE ELLIPTICITY BEING ASSUMED $\frac{1}{300}$.

Lat.	1° Long.	Lat.	1° Long.	Lat.	1° Long.
°	Miles.	°	Miles.	°	Miles.
0	60·000	30	52·004	60	33·074
1	59·991	31	51·475	61	29·162
2	59·963	32	50·929	62	28·241
3	59·918	33	50·369	63	27·311
4	59·855	34	49·793	64	26·373
5	59·773	35	49·202	65	25·426
6	59·673	36	48·596	66	24·472
7	59·556	37	47·975	67	23·510
8	59·421	38	47·339	68	22·541
9	59·267	39	46·689	69	21·565
10	59·095	40	46·025	70	20·581
11	58·905	41	45·346	71	19·592
12	58·698	42	44·654	72	18·596
13	58·472	43	43·948	73	17·595
14	58·229	44	43·228	74	16·589
15	57·969	45	42·496	75	15·576
16	57·690	46	41·750	76	14·560
17	57·395	47	40·991	77	13·539
18	57·081	48	40·220	78	12·514
19	56·751	49	39·437	79	11·485
20	56·403	50	38·641	80	10·452
21	56·038	51	37·834	81	9·416
22	55·656	52	37·014	82	8·378
23	55·258	53	36·184	83	7·337
24	54·842	54	35·342	84	6·293
25	54·411	55	34·491	85	5·247
26	53·962	56	33·628	86	4·199
27	53·497	57	32·754	87	3·149
28	53·015	58	31·870	88	2·100
29	52·518	59	30·977	89	1·050
30	52·004	60	30·074	90	0·000

TABLE OF THE VELOCITY AND THE FORCE OF THE WIND.

VELOCITY.		Force on 1 Square Foot in Pounds Avoir.	Character of the Wind.
Miles per Hour.	Feet per Second.		
1	1·47	·005	Hardly perceptible.
2	2·93	·020	
3	4·40	·044	
4	5·87	·079	Just perceptible.
5	7·33	·123	
6	8·80	·177	
7	10·27	·241	Gentle, pleasant wind.
8	11·73	·315	
9	13·20	·399	
10	14·67	·492	Moderate breeze.
11	16·13	·595	
12	17·60	·708	
13	19·07	·831	Pleasant, brisk gale.
14	20·53	·964	
15	22·00	1·107	
20	29·33	1·968	Very brisk.
25	36·67	3·075	
30	44·00	4·429	
35	51·33	6·027	High winds.
40	58·67	7·873	
45	66·00	9·963	
50	73·33	12·300	Very high.
55	80·67	14·883	
60	88·00	17·715	
65	95·33	20·787	Storm or tempest.
70	102·67	24·108	
75	110·00	27·675	
80	117·33	31·490	Great storm.
85	124·67	35·547	
90	132·00	39·852	
100	146·67	49·200	Destructive hurricane.

TABLE

OF THE ANGLES WHICH EVERY POINT AND QUARTER-POINT
OF THE COMPASS MAKES WITH THE MERIDIAN.

NORTH.		Points.	° ' "	Points.	SOUTH.	
N. by E.	N. by W.	0 $\frac{1}{4}$	2 48 45	0 $\frac{1}{4}$	S. by E.	S. by W.
		0 $\frac{1}{2}$	5 37 30	0 $\frac{1}{2}$		
		0 $\frac{3}{4}$	8 26 15	0 $\frac{3}{4}$		
		1	11 15 0	1		
N. N. E.	N. N. W.	1 $\frac{1}{4}$	14 3 45	1 $\frac{1}{4}$	S. S. E.	S. S. W.
		1 $\frac{1}{2}$	16 52 30	1 $\frac{1}{2}$		
		1 $\frac{3}{4}$	19 41 15	1 $\frac{3}{4}$		
		2	22 30 0	2		
N. E. by N.	N. W. by N.	2 $\frac{1}{4}$	25 18 45	2 $\frac{1}{4}$	S. E. by S.	S. W. by S.
		2 $\frac{1}{2}$	28 7 30	2 $\frac{1}{2}$		
		2 $\frac{3}{4}$	30 56 15	2 $\frac{3}{4}$		
		3	33 45 0	3		
N. E.	N. W.	3 $\frac{1}{4}$	36 33 45	3 $\frac{1}{4}$	S. E.	S. W.
		3 $\frac{1}{2}$	39 22 30	3 $\frac{1}{2}$		
		3 $\frac{3}{4}$	42 11 15	3 $\frac{3}{4}$		
		4	45 0 0	4		
N. E. by E.	N. W. by W.	4 $\frac{1}{4}$	47 48 45	4 $\frac{1}{4}$	S. E. by E.	S. W. by W.
		4 $\frac{1}{2}$	50 37 30	4 $\frac{1}{2}$		
		4 $\frac{3}{4}$	53 26 15	4 $\frac{3}{4}$		
		5	56 15 0	5		
E. N. E.	W. N. W.	5 $\frac{1}{4}$	59 3 45	5 $\frac{1}{4}$	E. S. E.	W. S. W.
		5 $\frac{1}{2}$	61 52 30	5 $\frac{1}{2}$		
		5 $\frac{3}{4}$	64 41 15	5 $\frac{3}{4}$		
		6	67 30 0	6		
E. by N.	W. by N.	6 $\frac{1}{4}$	70 18 45	6 $\frac{1}{4}$	E. by S.	W. by S.
		6 $\frac{1}{2}$	73 7 30	6 $\frac{1}{2}$		
		6 $\frac{3}{4}$	75 56 15	6 $\frac{3}{4}$		
		7	78 45 0	7		
East.	West.	7 $\frac{1}{4}$	81 33 45	7 $\frac{1}{4}$	East.	West.
		7 $\frac{1}{2}$	84 22 30	7 $\frac{1}{2}$		
		7 $\frac{3}{4}$	87 11 15	7 $\frac{3}{4}$		
		8	90 0 0	8		

TABLE

OF LOGARITHMIC SINES, TANGENTS, AND SECANTS, TO EVERY
POINT AND QUARTER-POINT OF THE COMPASS.

Points.	Sine.	Cosine.	Tang.	Cotang.	Secant.	Cosec.	Points.
0	0.000000	10.000000	0.000000	Infinite.	10.000000	Infinite.	8
0 $\frac{1}{4}$	8.690796	9.999477	8.691319	11.308681	10.000523	11.309204	7 $\frac{3}{4}$
0 $\frac{1}{2}$	8.991302	9.997904	8.993398	11.006602	10.002096	11.008698	7 $\frac{1}{2}$
0 $\frac{3}{4}$	9.166520	9.995274	9.171247	10.828753	10.004726	10.833480	7 $\frac{1}{4}$
1	9.290236	9.991574	9.298662	10.701338	10.008426	10.709764	7
1 $\frac{1}{4}$	9.385571	9.986786	9.398735	10.601215	10.013214	10.614429	6 $\frac{3}{4}$
1 $\frac{1}{2}$	9.462824	9.980885	9.481939	10.518061	10.019115	10.537176	6 $\frac{1}{2}$
1 $\frac{3}{4}$	9.527488	9.973841	9.553647	10.446353	10.026159	10.472512	6 $\frac{1}{4}$
2	9.582840	9.965615	9.617224	10.382776	10.034385	10.417160	6
2 $\frac{1}{4}$	9.630992	9.956163	9.674829	10.325171	10.043837	10.369908	5 $\frac{3}{4}$
2 $\frac{1}{2}$	9.673387	9.945430	9.727957	10.272043	10.054570	10.326613	5 $\frac{1}{2}$
2 $\frac{3}{4}$	9.711050	9.933350	9.777700	10.222300	10.066650	10.288950	5 $\frac{1}{4}$
3	9.744739	9.919846	9.824893	10.175107	10.080154	10.255261	5
3 $\frac{1}{4}$	9.775027	9.904823	9.870199	10.129301	10.095172	10.224973	4 $\frac{3}{4}$
3 $\frac{1}{2}$	9.802359	9.888185	9.914173	10.085327	10.111815	10.197641	4 $\frac{1}{2}$
3 $\frac{3}{4}$	9.827084	9.869790	9.957295	10.042705	10.130210	10.172916	4 $\frac{1}{4}$
4	9.849485	9.849485	10.000000	10.000000	10.150515	10.150515	4
	Cosine.	Sine.	Cotang.	Tang.	Cosec.	Secant.	

SINES AND TANGENTS,

FOR EVERY

DEGREE AND MINUTE

OF

THE QUADRANT.

N. B. THE minutes in the left-hand column of each page, increasing downwards, belong to the degrees at the top; and those increasing upwards, in the right-hand column, belong to the degrees below.

M.	Sine	D.	Cosine	D.	Tang.	D.	Cotang.	
0	0.000000		10.000000		0.000000		Infinite.	60
1	6.463726	501717	000000	00	6.463726	501717	13.536274	59
2	764756	293485	000000	00	764756	293483	235244	58
3	940847	208231	000000	00	940847	208231	059153	57
4	7.065786	161517	000000	00	7.065786	161517	12.934214	56
5	162696	131968	600000	00	162696	131969	837304	55
6	241877	111575	9.999999	01	241878	111578	758122	54
7	308824	96653	999999	01	308825	99653	691175	53
8	366816	85254	999999	01	366817	85254	633183	52
9	417968	76263	999999	01	417970	76263	582030	51
10	463725	68988	999998	01	463727	68988	536273	50
11	7.505118	62981	9.999998	01	7.505120	62981	12.494880	49
12	542906	57936	999997	01	542909	57933	457091	48
13	577668	53641	999997	01	577672	53642	422328	47
14	609853	49938	999996	01	609857	49939	390143	46
15	639816	46714	999996	01	639820	46715	360180	45
16	667845	43881	999995	01	667849	43882	332151	44
17	694173	41372	999995	01	694179	41373	305821	43
18	718997	39135	999994	01	719003	39136	280997	42
19	742477	37127	999993	01	742484	37128	257516	41
20	764754	35315	999993	01	764761	35136	235239	40
21	7.785943	33672	9.999992	01	7.785951	33673	12.214049	39
22	806146	32175	999991	01	806155	32176	193845	38
23	825451	30805	999990	01	825460	30806	174540	37
24	843934	29547	999989	02	843944	29549	156056	36
25	861662	28388	999988	02	861674	28390	138326	35
26	878695	27317	999988	02	878708	27318	121292	34
27	895085	26323	999987	02	895099	26325	104901	33
28	910879	25399	999986	02	910894	25401	089106	32
29	926119	24538	999985	02	926134	24540	073866	31
30	940842	23733	999983	02	940858	23735	059142	30
31	7.955082	22980	9.999982	02	7.955100	22981	12.044900	29
32	968870	22273	999981	02	968889	22275	031111	28
33	982233	21608	999980	02	982253	21610	017747	27
34	995198	20981	999979	02	995219	20983	004781	26
35	8.007787	20390	999977	02	8.007809	20392	11.992191	25
36	020021	19831	999976	02	020045	19833	979955	24
37	031919	19302	999975	02	031945	19305	968055	23
38	043501	18801	999973	02	043527	18803	956473	22
39	054781	18325	999972	02	054809	18327	945191	21
40	065776	17872	999971	02	065806	17874	934194	20
41	8.076500	17441	9.999969	02	8.076531	17444	11.923469	19
42	086965	17031	999968	02	086997	17034	913003	18
43	097183	16639	999966	02	097217	16642	902783	17
44	107167	16265	999964	03	107202	16268	892797	16
45	116926	15908	999963	03	116963	15910	883037	15
46	126471	15566	999961	03	126510	15568	873490	14
47	135810	15238	999959	03	135851	15241	864149	13
48	144953	14924	999958	03	144996	14927	855604	12
49	153907	14622	999956	03	153952	14627	846048	11
50	162681	14333	999954	03	162727	14336	837273	10
51	8.171280	14054	9.999952	03	8.171328	14057	11.828672	9
52	179713	13786	999950	03	179763	13790	820237	8
53	187985	13529	999948	03	188036	13532	811964	7
54	196102	13280	999946	03	196156	13284	803844	6
55	204070	13041	999944	03	204126	13044	795874	5
56	211895	12810	999942	04	211953	12814	788047	4
57	219581	12587	999940	04	219641	12590	780359	3
58	227134	12372	999938	04	227195	12376	772805	2
59	234557	12164	999936	04	234621	12168	765379	1
60	241855	11963	999934	04	241921	11967	758079	0
	Cosine		Sine		Cotang.		Tang.	

M.	Sine	D.	Cosine	D.	Tang.	D.	Cotang.	
0	8-241855	11963	9-999934	04	8-241921	11967	11-758079	60
1	249033	11768	999932	04	249102	11772	750898	59
2	256094	11580	999929	04	256165	11584	743835	58
3	263042	11398	999927	04	263115	11402	736885	57
4	269881	11221	999925	04	269956	11225	730044	56
5	276614	11050	999922	04	276691	11054	723309	55
6	283243	10883	999920	04	283323	10887	716677	54
7	289773	10721	999918	04	289856	10726	710144	53
8	296207	10565	999915	04	296292	10570	703708	52
9	302546	10413	999913	04	302634	10418	697366	51
10	308794	10266	999910	04	308884	10270	691116	50
11	8-314954	10122	9-999907	04	8-315046	10126	11-684954	49
12	321027	9982	999905	04	321122	9987	678878	48
13	327016	9847	999902	04	327114	9851	672886	47
14	332924	9714	999899	05	333025	9719	666975	46
15	338753	9586	999897	05	338856	9590	661144	45
16	344504	9460	999894	05	344610	9465	655390	44
17	350181	9338	999891	05	350289	9343	649711	43
18	355783	9219	999888	05	355895	9224	644105	42
19	361315	9103	999885	05	361430	9108	638570	41
20	366777	8990	999882	05	366895	8995	633105	40
21	8-372171	8880	9-999879	05	8-372292	8885	11-627708	39
22	377499	8772	999876	05	377622	8777	622378	38
23	382762	8667	999873	05	382889	8672	617111	37
24	387962	8564	999870	05	388092	8570	611908	36
25	393101	8464	999867	05	393234	8470	606766	35
26	368179	8366	999864	05	398315	8371	601685	34
27	403199	8271	999861	05	403338	8276	596662	33
28	408161	8177	999858	05	408304	8182	591696	32
29	413068	8086	999854	05	413213	8091	586787	31
30	417919	7996	999851	06	418068	8002	581932	30
31	8-422717	7909	9-999848	06	8-422869	7914	11-577131	29
32	427462	7823	999844	06	427618	7830	572382	28
33	432156	7740	999841	06	432315	7745	567685	27
34	436800	7657	999838	06	436962	7663	563038	26
35	441394	7577	999834	06	441560	7583	558440	25
36	445941	7499	999831	06	446110	7505	553890	24
37	450440	7422	999827	06	450613	7428	549387	23
38	454893	7346	999823	06	455070	7352	544930	22
39	459301	7273	999820	06	459481	7279	540519	21
40	463665	7200	999816	06	463849	7206	536151	20
41	8-467985	7129	9-999812	06	8-468172	7135	11-531828	19
42	472263	7060	999809	06	472454	7066	527546	18
43	476498	6991	999805	06	476693	6998	523307	17
44	480693	6924	999801	06	480892	6931	519108	16
45	484848	6859	999797	07	485050	6865	514950	15
46	488963	6794	999793	07	489170	6801	510830	14
47	493040	6731	999790	07	493250	6738	506750	13
48	497078	6669	999786	07	497293	6676	502707	12
49	501080	6608	999782	07	501298	6615	498702	11
50	505045	6548	999778	07	505267	6555	494733	10
51	8-508974	6489	9-999774	07	8-509200	6496	11-490800	9
52	512867	6431	999769	07	513098	6439	486902	8
53	516726	6375	999765	07	516961	6382	483039	7
54	520551	6319	999761	07	520790	6326	479210	6
55	524343	6264	999757	07	524586	6272	475414	5
56	528102	6211	999753	07	528349	6218	471651	4
57	531828	6158	999748	07	532080	6165	467920	3
58	535523	6106	999744	07	535779	6113	464221	2
59	539186	6055	999740	07	539447	6062	460553	1
60	542819	6004	999735	07	543084	6012	456916	0
	Cosine		Sine		Cotang.		Tang.	M.

M.	Sine	D.	Cosine	D.	Tang.	D.	Cotang.	
0	8542819	6004	9999735	07	8543084	6012	11456916	60
1	546422	5955	9999731	07	546691	5962	453309	59
2	549095	5906	9999726	07	550268	5914	449732	58
3	553539	5858	9999722	08	553817	5866	446183	57
4	557054	5811	9999717	08	557336	5819	442664	56
5	560540	5765	9999713	08	560828	5773	439172	55
6	563999	5719	9999708	08	564291	5727	435709	54
7	567431	5674	9999704	08	567727	5682	432273	53
8	570836	5630	9999699	08	571137	5638	428863	52
9	574214	5587	9999694	08	574520	5595	425480	51
10	577566	5544	9999689	08	577877	5552	422123	50
11	8580892	5502	9999685	08	8581208	5510	11418792	49
12	584193	5460	9999680	08	584514	5468	415486	48
13	587469	5419	9999675	08	587795	5427	412205	47
14	590721	5379	9999670	08	591051	5387	408949	46
15	593948	5339	9999665	08	594283	5347	405717	45
16	597152	5300	9999660	08	597492	5308	402508	44
17	600332	5261	9999655	08	600877	5270	399323	43
18	603489	5223	9999650	08	603839	5232	396161	42
19	606623	5186	9999645	09	606978	5194	393022	41
20	609734	5149	9999640	09	610094	5158	389906	40
21	8612823	5112	9999635	09	8613189	5121	11386811	39
22	615891	5076	9999629	09	616262	5085	383738	38
23	618937	5041	9999624	09	619313	5050	380687	37
24	621962	5006	9999619	09	622343	5015	377657	36
25	624965	4972	9999614	09	625352	4981	374648	35
26	627948	4938	9999608	09	628340	4947	371660	34
27	630911	4904	9999603	09	631308	4913	368692	33
28	633854	4871	9999597	09	634256	4880	365744	32
29	636776	4839	9999592	09	637184	4843	362816	31
30	639680	4806	9999586	09	640093	4816	359907	30
31	8642563	4775	9999581	09	8642982	4784	11357018	29
32	645428	4743	9999575	09	645853	4753	354147	28
33	648274	4712	9999570	09	648704	4722	351296	27
34	651102	4682	9999564	09	651537	4691	348493	26
35	653911	4652	9999558	10	654352	4661	345643	25
36	656702	4622	9999553	10	657149	4631	342851	24
37	659475	4592	9999547	10	659928	4602	340072	23
38	662230	4563	9999541	10	662689	4573	337311	22
39	664968	4535	9999535	10	665433	4544	334567	21
40	667689	4506	9999529	10	668160	4525	331840	20
41	8670393	4479	9999524	10	8670870	4488	11329130	19
42	673080	4451	9999518	10	673563	4461	326437	18
43	675751	4424	9999512	10	676239	4434	323761	17
44	678405	4397	9999506	10	678900	4417	321100	16
45	681043	4370	9999500	10	681544	4380	318456	15
46	683665	4344	9999493	10	684172	4354	315828	14
47	686272	4318	9999487	10	686784	4328	313216	13
48	688863	4292	9999481	10	689381	4303	310619	12
49	691438	4267	9999475	10	691963	4277	308037	11
50	693998	4242	9999469	10	694529	4252	305471	10
51	8696543	4217	9999463	11	8697081	4228	11302919	9
52	699073	4192	9999456	11	699617	4203	300383	8
53	701589	4168	9999450	11	702139	4179	297861	7
54	704090	4144	9999443	11	704646	4155	295354	6
55	706577	4121	9999437	11	707140	4132	292860	5
56	709049	4097	9999431	11	709618	4108	290382	4
57	711507	4074	9999424	11	712083	4085	287917	3
58	713952	4051	9999418	11	714534	4062	285465	2
59	716383	4029	9999411	11	716972	4040	283028	1
60	718800	4006	9999404	11	719396	4017	280604	0
	Cosine		Sine		Cotang.		Tang.	M.

M.	Sine	D.	Cosine	D.	Tang.	D.	Cotang.	
0	8718800	4006	9999404	11	8719396	4017	11280604	60
1	721204	3984	999398	11	721806	3995	278194	59
2	723595	3962	999391	11	724204	3974	275796	58
3	725972	3941	999384	11	726588	3952	273412	57
4	728337	3919	999378	11	728959	3930	271041	56
5	730638	3898	999371	11	731317	3909	268683	55
6	733027	3877	999364	12	733663	3889	266337	54
7	735354	3857	999357	12	735996	3868	264004	53
8	737667	3836	999350	12	738317	3848	261683	52
9	739969	3816	999343	12	740626	3827	259374	51
10	742259	3796	999336	12	742922	3807	257078	50
11	8744536	3776	9999329	12	8745207	3787	11254793	49
12	746802	3756	999332	12	747479	3768	255221	48
13	749055	3737	999315	12	749740	3749	252960	47
14	751297	3717	999308	12	751989	3729	248011	46
15	753528	3698	999301	12	754227	3710	245773	45
16	755747	3679	999294	12	756453	3692	243547	44
17	757955	3661	999286	12	758668	3673	241332	43
18	760151	3642	999279	12	760872	3655	239123	42
19	762337	3624	999272	12	763065	3636	236935	41
20	764511	3606	999265	12	765246	3618	234754	40
21	8766675	3588	9999257	12	8767417	3600	11232583	39
22	768828	3570	999250	13	769578	3583	230422	38
23	770970	3553	999242	13	771727	3565	228273	37
24	773101	3535	999235	13	773866	3548	226134	36
25	775223	3518	999227	13	775995	3531	224005	35
26	777333	3501	999220	13	778114	3514	221886	34
27	779434	3484	999212	13	780222	3497	219778	33
28	781524	3467	999205	13	782320	3480	217680	32
29	783605	3451	999197	13	784408	3464	215592	31
30	785675	3431	999189	13	786486	3447	213514	30
31	8787736	3418	9999181	13	8788554	3431	11211446	29
32	789787	3402	999174	13	790613	3414	209387	28
33	791828	3386	999166	13	792662	3399	207328	27
34	793859	3370	999158	13	794701	3383	205299	26
35	795881	3354	999150	13	796731	3368	203269	25
36	797894	3339	999142	13	798752	3352	201248	24
37	799897	3323	999134	13	800763	3337	199237	23
38	801892	3308	999126	13	802765	3322	197235	22
39	803876	3293	999118	13	804758	3307	195242	21
40	805852	3278	999110	13	806742	3292	193258	20
41	8807819	3263	9999102	13	8808717	3278	11191283	19
42	809777	3249	999094	14	810683	3262	189317	18
43	811726	3234	999086	14	812641	3248	187359	17
44	813667	3219	999077	14	814589	3233	185411	16
45	815599	3205	999069	14	816529	3219	183471	15
46	817522	3191	999061	14	818461	3205	181539	14
47	819436	3177	999053	14	820384	3191	179616	13
48	821343	3163	999044	14	822298	3177	177702	12
49	823240	3149	999036	14	824205	3163	175795	11
50	825130	3135	999027	14	826103	3150	173897	10
51	8827011	3122	9999019	14	8827992	3136	11172008	9
52	828284	3108	999010	14	829874	3123	170126	8
53	830749	3095	999002	14	831748	3110	168252	7
54	832607	3082	998993	14	833613	3096	166387	6
55	834456	3069	998984	14	835471	3083	164529	5
56	836297	3056	998976	14	837321	3070	162679	4
57	838130	3043	998967	15	839163	3057	160837	3
58	839956	3030	998958	15	840998	3045	159062	2
59	841774	3017	998950	15	842825	3032	157175	1
60	843585	3000	998941	15	844644	3019	155356	0
	Cosine		Sine		Cotang.		Tang.	M.

M.	Sine	D.	Cosine	D.	Tang.	D.	Cotang.	
0	8843585	3005	9998941	15	8844644	3019	11155356	66
1	845387	2992	998932	15	846455	3007	153545	59
2	847183	2980	998923	15	848260	2995	151740	58
3	848971	2967	998914	15	850057	2982	149943	57
4	850751	2955	998905	15	851846	2970	148154	56
5	852525	2943	998896	15	853628	2958	146372	55
6	854291	2931	998887	15	855403	2946	144597	54
7	856049	2919	998878	15	857171	2935	142829	53
8	857801	2907	998869	15	858932	2923	141068	52
9	859546	2896	998860	15	860686	2911	139314	51
10	861283	2884	998851	15	862433	2900	137567	50
11	8863014	2873	9998841	15	8864173	2888	11135827	49
12	864738	2861	998832	15	865906	2877	134094	48
13	866455	2850	998823	16	867632	2866	132368	47
14	868165	2839	998813	16	869351	2854	130649	46
15	869868	2828	998804	16	871064	2843	128936	45
16	871565	2817	998795	16	872770	2832	127230	44
17	873255	2806	998785	16	874469	2821	125531	43
18	874938	2795	998776	16	876162	2811	123838	42
19	876615	2786	998766	16	877849	2800	122151	41
20	878285	2773	998757	16	879529	2789	120471	40
21	8879949	2763	9998747	16	8881202	2779	1118798	39
22	881607	2752	998738	16	882869	2768	117131	38
23	883258	2742	998728	16	884530	2758	115470	37
24	884903	2731	998718	16	886185	2747	113815	36
25	886542	2721	998708	16	887833	2737	112167	35
26	888174	2711	998699	16	889476	2727	110524	34
27	889801	2700	998689	16	891112	2717	108888	33
28	891421	2690	998679	16	892742	2707	107258	32
29	893035	2680	998669	17	894366	2697	105634	31
30	894643	2670	998659	17	895984	2687	104016	30
31	8896246	2660	9998649	17	8897596	2677	11102404	29
32	897842	2651	998639	17	899203	2667	100797	28
33	899432	2641	998629	17	900803	2658	999197	27
34	901017	2631	998619	17	902398	2648	997602	26
35	902596	2622	998609	17	903987	2638	996013	25
36	904169	2612	998599	17	905570	2629	994430	24
37	905736	2603	998589	17	907147	2620	992853	23
38	907297	2593	998578	17	908719	2610	991281	22
39	908853	2584	998568	17	910285	2601	989715	21
40	910404	2575	998558	17	911846	2592	988154	20
41	8911949	2566	9998548	17	8913401	2583	11086599	19
42	913488	2556	998537	17	914951	2574	985049	18
43	915022	2547	998527	17	916495	2565	983505	17
44	916550	2538	998516	18	918034	2556	981966	16
45	918073	2529	998506	18	919568	2547	980432	15
46	919591	2520	998495	18	921096	2538	978904	14
47	921103	2512	998485	18	922619	2530	977381	13
48	922610	2503	998474	18	924136	2521	975864	12
49	924112	2494	998464	18	925649	2512	974351	11
50	925609	2486	998453	18	927156	2503	972844	10
51	8927100	2477	9998442	18	8928658	2495	11071342	9
52	928587	2469	998431	18	930155	2486	969845	8
53	930068	2460	998421	18	931647	2478	968353	7
54	931544	2452	998410	18	933134	2470	966866	6
55	933015	2443	998399	18	934616	2461	965384	5
56	934481	2435	998388	18	936093	2453	963907	4
57	935942	2427	998377	18	937565	2445	962435	3
58	937398	2419	998366	18	939032	2437	960968	2
59	938850	2411	998355	18	940494	2430	959506	1
60	940296	2403	998344	18	941952	2421	958048	0
	Cosine		Sine		Cotang.		Tang.	M.

M.	Sine	D.	Cosine	D.	Tang.	D.	Cotang.	
0	8-940236	2403	9-998344	19	8-941952	2421	11-058048	60
1	941738	2394	998333	19	943404	2413	056596	59
2	943174	2387	998322	19	944852	2405	055148	58
3	944606	2379	998311	19	946295	2397	053705	57
4	946034	2371	998300	19	947734	2390	052266	56
5	947456	2363	998289	19	949168	3282	050832	55
6	948874	2355	998277	19	950597	2374	049403	54
7	950287	2348	998266	19	952021	2366	047979	53
8	951696	2340	998255	19	953441	2360	046559	52
9	953100	2332	998243	19	954856	2351	045144	51
10	954499	2325	998232	19	956267	2344	043733	50
11	8-955894	2317	9-998220	19	8-957674	2337	11-042326	49
12	957284	2310	998209	19	959075	2329	040925	48
13	958670	2302	998197	19	960473	2323	039527	47
14	960052	2295	998186	19	961866	2314	038134	46
15	961429	2288	998174	19	963255	2307	036745	45
16	962801	2280	998163	19	964639	2300	035361	44
17	964170	2273	998151	19	966019	2293	033981	43
18	965534	2266	998139	20	967394	2286	032606	42
19	966893	2259	998128	20	968766	2279	031234	41
20	968249	2252	998116	20	970123	2271	029867	40
21	8-969600	2244	9-998104	20	8-971496	2265	11-028504	39
22	970947	2238	998092	20	972855	2257	027145	38
23	972289	2231	998080	20	974209	2251	025791	37
24	973628	2224	998068	20	975560	2244	024440	36
25	974962	2217	998056	20	976906	2237	023094	35
26	976293	2210	998044	20	978248	2230	021752	34
27	977619	2203	998032	20	979586	2223	020414	33
28	978941	2197	998020	20	980921	2217	019079	32
29	980259	2190	998008	20	982251	2210	017749	31
30	981573	2183	997996	20	983577	2204	016423	30
31	8-982883	2177	9-997984	20	8-984899	2197	11-015101	29
32	984189	2170	997972	20	986217	2191	013783	28
33	985491	2163	997959	20	987532	2184	012468	27
34	986789	2157	997947	20	988842	2178	011158	26
35	988083	2150	997935	21	990149	2171	009851	25
36	989374	2144	997922	21	991451	2165	008549	24
37	990660	2138	997910	21	992750	2158	007250	23
38	991943	2131	997897	21	994045	2152	005955	22
39	993222	2125	997885	21	995337	2146	004663	21
40	994497	2119	997872	21	996624	2140	003376	20
41	8-995768	2112	9-997860	21	8-997968	2134	11-002092	19
42	997036	2106	997847	21	999188	2127	000812	18
43	998299	2100	997835	21	000465	2121	10-999535	17
44	999560	2094	997822	21	001738	2115	998262	16
45	9-000816	2087	997809	21	003007	2109	996993	15
46	002069	2082	997797	21	004272	2103	995728	14
47	003318	2076	997784	21	005534	2097	994466	13
48	004563	2070	997771	21	006792	2091	993208	12
49	005805	2064	997758	21	008047	2085	991953	11
50	007044	2058	997745	21	009298	2080	990702	10
51	8-008278	2052	8-997732	21	8-010546	2074	10-989454	9
52	009510	2046	997719	21	011790	2068	988210	8
53	010737	2040	997706	21	013031	2062	986969	7
54	011962	2034	997693	22	014268	2056	985732	6
55	013182	2029	997680	22	015502	2051	984498	5
56	014400	2023	997667	22	016732	2045	983268	4
57	015613	2017	997654	22	017959	2040	982041	3
58	016824	2012	997641	22	019183	2033	980817	2
59	018031	2006	997628	22	020403	2028	979597	1
60	019235	2000	997614	22	021620	2023	978380	0
	Cosine		Sine		Cotang.		Tang.	M.

M.	Sine	D.	Cosine	D.	Tang.	D.	Cotang.	
0	9.019235	2000	9.997614	22	9.021620	2023	10.978380	60
1	020435	1995	997601	22	022834	2017	977166	59
2	021632	1989	997588	22	024044	2011	975956	58
3	022825	1984	997574	22	025251	2006	974749	57
4	024016	1978	997561	22	026455	2000	973545	56
5	025203	1973	997547	22	027655	1995	972345	55
6	026386	1967	997534	23	028852	1990	971148	54
7	027567	1962	997520	23	030046	1985	969954	53
8	028744	1957	997507	23	031237	1979	968763	52
9	029918	1951	997493	23	032425	1974	967575	51
10	031089	1947	997480	23	033609	1969	966391	50
11	9.032257	1941	9.997466	23	9.034791	1964	10.965209	49
12	033421	1936	997452	23	035969	1958	964031	48
13	034582	1930	997439	23	037144	1953	962856	47
14	035741	1925	997425	23	038316	1948	961684	46
15	036896	1920	997411	23	039485	1943	960515	45
16	038048	1915	997397	23	040651	1938	959349	44
17	039197	1910	997383	23	041813	1933	958187	43
18	040342	1905	997369	23	042973	1928	957027	42
19	041485	1899	997355	23	044130	1923	955870	41
20	042625	1894	997341	23	045284	1918	954716	40
21	9.043762	1889	9.997327	24	9.046434	1913	10.953566	39
22	044895	1884	997313	24	047582	1908	952418	38
23	046026	1879	997299	24	048727	1903	951273	37
24	047154	1875	997285	24	049869	1898	950131	36
25	048279	1970	997271	24	051008	1893	948992	35
26	049400	1865	997257	24	052144	1889	947856	34
27	050519	1860	997242	24	053277	1884	946723	33
28	051635	1855	997228	24	054407	1879	945593	32
29	052749	1850	997214	24	055535	1874	944465	31
30	053859	1845	997199	24	056659	1870	943341	30
31	054966	1841	9.997185	24	9.057781	1865	10.942219	29
32	056071	1836	997170	24	058900	1869	941100	28
33	057172	1831	997156	24	060016	1855	939984	27
34	058271	1827	997141	24	061130	1851	938870	26
35	059367	1822	997127	24	062240	1846	937760	25
36	060460	1817	997112	24	063348	1842	936652	24
37	061551	1813	997098	24	064453	1837	935547	23
38	062639	1808	997083	25	065556	1833	934444	22
39	063724	1804	997068	25	066655	1828	933345	21
40	064806	1799	997053	25	067752	1824	932248	20
41	9.065885	1794	9.997039	25	9.068846	1819	10.931154	19
42	066962	1790	997024	25	069938	1815	930062	18
43	068036	1786	997009	25	071027	1810	928973	17
44	069107	1781	996994	25	072113	1806	927887	16
45	070176	1777	996979	25	073197	1802	926803	15
46	071242	1772	996964	25	074278	1797	925722	14
47	072306	1768	996949	25	075356	1793	924644	13
48	073366	1763	996934	25	076432	1789	923568	12
49	074424	1759	996919	25	077505	1784	922495	11
50	075480	1755	996904	25	078576	1780	921424	10
51	9.076533	1750	9.996889	25	9.079644	1776	10.920356	9
52	077583	1746	996874	25	080710	1772	919290	8
53	078631	1742	996858	25	081773	1767	918227	7
54	079676	1738	996843	25	082833	1763	917167	6
55	080719	1733	996828	25	083891	1759	916109	5
56	081759	1729	996812	26	084947	1755	915053	4
57	082797	1725	996797	26	086000	1751	914060	3
58	083832	1721	996782	26	087050	1747	912950	2
59	084864	1717	996766	26	088098	1743	911902	1
60	085894	1713	996751	26	089144	1738	910856	0

Cosine

Sine

Cotang.

Tang.

M.

M.	Sine	D.	Cosine	D.	Tang.	D.	Cotang.	
0	9.085894	1713	9.996751	26	9.089144	1738	10.910856	60
1	086922	1709	996735	26	090187	1734	909813	59
2	087947	1704	996720	26	091228	1730	908772	58
3	088970	1700	996704	26	092266	1727	907734	57
4	089990	1696	996688	26	093302	1722	906698	56
5	091008	1692	996673	26	094336	1719	905664	55
6	092024	1688	996657	26	095367	1715	904633	54
7	093037	1684	996641	26	096395	1711	903605	53
8	094047	1680	996625	26	097422	1707	902578	52
9	095056	1676	996610	26	098446	1703	901554	51
10	096062	1673	996594	26	099468	1699	900532	50
11	9.097005	1668	9.996578	27	9.100487	1695	10.899513	49
12	098066	1665	996562	27	101504	1691	898496	48
13	099065	1661	996546	27	102519	1687	897481	47
14	100062	1657	996530	27	103532	1684	896468	46
15	101056	1653	996514	27	104542	1680	895458	45
16	102048	1649	996498	27	105550	1676	894450	44
17	103037	1645	996482	27	106556	1672	893444	43
18	104025	1641	996465	27	107559	1669	892441	42
19	105010	1638	996449	27	108560	1665	891440	41
20	105992	1634	996433	27	109559	1661	890441	40
21	9.106973	1630	9.996417	27	9.110556	1658	10.889444	39
22	107951	1627	996400	27	111551	1654	888449	38
23	108927	1623	996384	27	112543	1650	887457	37
24	109901	1619	996368	27	113533	1646	886467	36
25	110873	1616	996351	27	114521	1643	885479	35
26	111842	1612	996335	27	115507	1639	884493	34
27	112809	1608	996318	27	116491	1636	883509	33
28	113774	1605	996302	28	117472	1632	882528	32
29	114737	1601	996285	28	118452	1629	881548	31
30	115698	1597	996269	28	119429	1625	880571	30
31	9.116656	1594	9.996252	28	9.120404	1622	10.879596	29
32	117613	1590	996235	28	121377	1618	878623	28
33	118567	1587	996219	28	122348	1615	877652	27
34	119519	1583	996202	28	123317	1611	876683	26
35	120469	1580	996185	28	124284	1607	875716	25
36	121417	1576	996168	28	125249	1604	874751	24
37	122362	1573	996151	28	126211	1601	873789	23
38	123306	1569	996134	28	127172	1597	872828	22
39	124248	1566	996117	28	128130	1594	871870	21
40	125187	1562	996100	28	129087	1591	870913	20
41	9.126125	1559	9.996083	29	9.130041	1587	10.869959	19
42	127060	1556	996066	29	130994	1584	869006	18
43	127993	1552	996049	29	131944	1581	868056	17
44	128925	1549	996032	29	132893	1577	867107	16
45	129854	1545	996015	29	133839	1574	866161	15
46	130781	1542	995998	29	134784	1571	865216	14
47	131706	1539	995980	29	135726	1567	864274	13
48	132630	1535	995963	29	136667	1564	863333	12
49	133551	1532	995946	29	137605	1561	862395	11
50	134470	1529	995928	29	138542	1558	861458	10
51	9.139387	1525	9.995911	29	9.139476	1555	10.860524	9
52	136303	1522	995894	29	140409	1551	859591	8
53	137216	1519	995876	29	141340	1548	858660	7
54	138128	1516	995859	29	142269	1545	857731	6
55	139037	1512	995841	29	143196	1542	856804	5
56	139944	1509	995823	29	144121	1539	855879	4
57	140850	1506	995806	29	145044	1535	854956	3
58	141754	1503	995788	29	145966	1532	854034	2
59	142655	1500	995771	29	146885	1529	853115	1
60	143555	1496	995753	29	147803	1526	852197	0
	Cosine		Sine		Cotang.		Tang.	M.

M.	Sine	D.	Cosine	D.	Tang.	D.	Cotang.	
0	9.143555	1496	9.995753	30	9.147803	1526	10.852197	60
1	144453	1493	995735	30	148718	1523	851282	59
2	145349	1490	995717	30	149632	1520	850368	58
3	146243	1487	995699	30	150544	1517	849456	57
4	147136	1484	995681	30	151454	1514	848546	56
5	148026	1481	995664	30	152363	1511	847637	55
6	148915	1478	995646	30	153269	1508	846731	54
7	149802	1475	995628	30	154174	1505	845826	53
8	150686	1472	995610	30	155077	1502	844923	52
9	151569	1469	995591	30	155978	1499	844022	51
10	152451	1466	995573	30	156877	1496	843123	50
11	9.153330	1463	9.995555	30	9.157775	1493	10.842225	49
12	154208	1460	995537	30	158671	1490	841329	48
13	155083	1457	995519	30	159565	1487	840435	47
14	155957	1454	995501	31	160457	1484	839543	46
15	156830	1451	995482	31	161347	1481	838653	45
16	157700	1448	995464	31	162236	1479	837764	44
17	158569	1445	995446	31	163123	1476	836877	43
18	159435	1442	995427	31	164008	1473	835992	42
19	160301	1439	995409	31	164892	1470	835108	41
20	161164	1436	995390	31	165774	1467	834226	40
21	9.162025	1433	9.995372	31	9.166654	1464	10.833346	39
22	162885	1430	995353	31	167532	1461	832468	38
23	163743	1427	995334	31	168409	1458	831591	37
24	164600	1424	995316	31	169284	1455	830716	36
25	165454	1422	995297	31	170157	1453	829843	35
26	166307	1419	995278	31	171029	1450	828971	34
27	167159	1416	995260	31	171899	1447	828101	33
28	168008	1413	995241	32	172767	1444	827233	32
29	168856	1410	995222	32	173634	1442	826366	31
30	169702	1407	995203	32	174499	1439	825501	30
31	9.170547	1405	9.995184	32	9.175362	1436	10.824638	29
32	171389	1402	995165	32	176224	1433	823776	28
33	172230	1399	995146	32	177084	1431	822916	27
34	173070	1396	995127	32	177942	1428	822058	26
35	173908	1394	995108	32	178799	1425	821201	25
36	174744	1391	995089	32	179655	1423	820345	24
37	175578	1388	995070	32	180508	1420	819492	23
38	176411	1386	995051	32	181360	1417	818640	22
39	177242	1383	995032	32	182211	1415	817789	21
40	178072	1380	995013	32	183059	1412	816941	20
41	9.178900	1377	9.994993	32	9.183907	1409	10.816093	19
42	179726	1374	994974	32	184752	1407	815248	18
43	180551	1372	994955	32	185597	1404	814403	17
44	181374	1369	994935	32	186439	1402	813561	16
45	182196	1366	994916	33	187280	1399	812720	15
46	183016	1364	994896	33	188120	1396	811880	14
47	183834	1361	994877	33	188958	1393	811042	13
48	184651	1359	994857	33	189794	1391	810206	12
49	185466	1356	994838	33	190629	1389	809371	11
50	186280	1353	994818	33	191462	1386	808538	10
51	9.187092	1351	9.994798	33	9.192294	1384	10.807706	9
52	187903	1348	994779	33	193124	1381	806876	8
53	188712	1346	994759	33	193953	1379	806047	7
54	189519	1343	994739	33	194780	1376	805220	6
55	190325	1341	994719	33	195606	1374	804394	5
56	191130	1338	994700	33	196430	1371	803570	4
57	191933	1336	994680	33	197253	1369	802747	3
58	192734	1333	994660	33	198074	1366	801926	2
59	193534	1330	994640	33	198894	1364	801106	1
60	194332	1328	994620	33	199713	1361	800287	0
	Cosine		Sine		Cotang.		Tang.	M.

M.	Sine	D.	Cosine	D.	Tang.	D.	Cotang.	
0	9-194332	1328	9-994620	33	9-199713	1361	10-800287	60
1	195129	1326	994600	33	200529	1359	799471	59
2	195925	1323	994580	33	201345	1356	798655	58
3	196719	1321	994560	34	202159	1354	797841	57
4	197511	1318	994540	34	202971	1352	797029	56
5	198302	1316	994519	34	203782	1349	796218	55
6	199091	1313	994499	34	204592	1347	795408	54
7	199879	1311	994479	34	205400	1345	794600	53
8	200666	1308	994459	34	206207	1342	793793	52
9	201451	1306	994438	34	207013	1340	792987	51
10	202234	1304	994418	34	207817	1338	792183	50
11	9-203017	1301	9-994397	34	9-208619	1335	10-791381	49
12	203797	1299	994377	34	209420	1333	790580	48
13	204577	1296	994357	34	210220	1331	789780	47
14	205354	1294	994336	34	211018	1328	788982	46
15	206131	1292	994316	34	211815	1326	788185	45
16	206906	1289	994295	34	212611	1324	787389	44
17	207679	1287	994274	35	213405	1321	786595	43
18	208452	1285	994254	35	214198	1319	785802	42
19	209222	1282	994233	35	214989	1317	785011	41
20	209992	1280	994212	35	215780	1315	784220	40
21	9-210760	1278	9-994191	35	9-216568	1312	10-783432	39
22	211526	1275	994171	35	217356	1310	782644	38
23	212291	1273	994150	35	218142	1308	781858	37
24	213055	1271	994129	35	218926	1305	781074	36
25	213818	1268	994108	35	219710	1303	780290	35
26	214579	1266	994087	35	220492	1301	779508	34
27	215338	1264	994066	35	221272	1299	778728	33
28	216097	1261	994045	35	222052	1297	777948	32
29	216854	1259	994024	35	222830	1294	777170	31
30	217609	1257	994003	35	223606	1292	776394	30
31	9-218363	1255	9-993981	35	9-224382	1290	10-775618	29
32	219116	1253	993960	35	225156	1288	774844	28
33	219868	1250	993939	35	225929	1286	774071	27
34	220618	1248	993918	35	226700	1284	773300	26
35	221367	1246	993896	36	227471	1281	772529	25
36	222115	1244	993875	36	228239	1279	771761	24
37	222861	1242	993854	36	229007	1277	770993	23
38	223606	1239	993832	36	229773	1275	770227	22
39	224349	1237	993811	36	230539	1273	769461	21
40	225092	1235	993789	36	231302	1271	768698	20
41	9-225833	1233	9-993768	36	9-232065	1269	10-767935	19
42	226573	1231	993746	36	232826	1267	767174	18
43	227311	1228	993725	36	233586	1265	766414	17
44	228048	1226	993703	36	234345	1262	765655	16
45	228784	1224	993681	36	235103	1260	764897	15
46	229518	1222	993660	36	235859	1258	764141	14
47	230252	1220	993638	36	236614	1256	763386	13
48	230984	1218	993616	36	237368	1254	762632	12
49	231714	1216	993594	37	238120	1252	761880	11
50	232444	1214	993572	37	238872	1250	761128	10
51	9-233172	1212	9-993550	37	9-239622	1248	10-760378	9
52	233909	1209	993528	37	240371	1246	759629	8
53	234625	1207	993506	37	241118	1244	758882	7
54	235349	1205	993484	37	241865	1242	758135	6
55	236073	1203	993462	37	242610	1240	757390	5
56	236795	1201	993440	37	243354	1238	756646	4
57	237515	1199	993418	37	244097	1236	755903	3
58	238235	1197	993396	37	244839	1234	755161	2
59	238953	1195	993374	37	245579	1232	754421	1
60	239670	1193	993351	37	246319	1230	753681	0
	Cosine		Sine		Cotang.		Tang.	M.

M.	Sine	D.	Cosine	D.	Tang.	D.	Cotang.	
0	9239670	1193	9993351	37	9246319	1230	10753681	60
1	240386	1191	993329	37	247057	1228	752943	59
2	241101	1189	993307	37	247794	1226	752206	58
3	241814	1187	993285	37	248530	1224	751470	57
4	242526	1185	993262	37	249264	1222	750736	56
5	243237	1183	993240	37	249998	1220	750002	55
6	243947	1181	993217	38	250730	1218	749270	54
7	244656	1179	993195	38	251461	1217	748539	53
8	245363	1177	993172	38	252191	1215	747809	52
9	246069	1175	993149	38	252920	1213	747080	51
10	246775	1173	993127	38	253648	1211	746352	50
11	9247478	1171	9993104	38	9254374	1209	10745626	49
12	248181	1169	993081	38	255100	1207	744900	48
13	248883	1167	993059	38	255824	1205	744176	47
14	249583	1165	993036	38	256547	1203	743453	46
15	250282	1163	993013	38	257269	1201	742731	45
16	250980	1161	992990	38	257990	1200	742010	44
17	251677	1159	992967	38	258710	1198	741290	43
18	252373	1158	992944	38	259429	1196	740571	42
19	253067	1156	992921	38	260146	1194	739854	41
20	253761	1154	992898	38	260863	1192	739137	40
21	9254453	1152	9992575	38	9261578	1190	10738422	39
22	255144	1150	992852	38	262292	1189	737708	38
23	255834	1148	992829	39	263005	1187	736995	37
24	256523	1146	992806	39	263717	1185	736283	36
25	257211	1144	992783	39	264428	1183	735572	35
26	257898	1142	992759	39	265138	1181	734862	34
27	258583	1141	992736	39	265847	1179	734153	33
28	259268	1139	992713	39	266555	1178	733445	32
29	259951	1137	992690	39	267261	1176	732739	31
30	260633	1135	992666	39	267967	1174	732033	30
31	9261314	1133	9992643	39	9268671	1172	10731329	29
32	261994	1131	992619	39	269375	1170	730625	28
33	262673	1130	992596	39	270077	1169	729923	27
34	263351	1128	992572	39	270779	1167	729221	26
35	264027	1126	992549	39	271479	1165	728521	25
36	264703	1124	992525	39	272178	1164	727822	24
37	265377	1122	992501	39	272876	1162	727124	23
38	266051	1120	992478	40	273573	1160	726427	22
39	266723	1119	992454	40	274269	1158	725731	21
40	267395	1117	992430	40	274964	1157	725036	20
41	9268065	1115	9992406	40	9275658	1155	10724342	19
42	268734	1113	992382	40	276351	1153	723649	18
43	269402	1111	992359	40	277043	1151	722957	17
44	270069	1110	992335	40	277734	1150	722266	16
45	270735	1108	992311	40	278424	1148	721576	15
46	271400	1106	992287	40	279113	1147	720887	14
47	272064	1105	992263	40	279801	1145	720199	13
48	272726	1103	992239	40	280488	1143	719512	12
49	273388	1101	992214	40	281174	1141	718826	11
50	274049	1199	992190	40	281858	1140	718142	10
51	9274708	1098	9992166	40	9282542	1138	10717458	9
52	275367	1096	992142	40	283225	1136	716775	8
53	276024	1094	992117	41	283907	1135	716093	7
54	276681	1092	992093	41	284588	1133	715412	6
55	277337	1091	992069	41	285268	1131	714732	5
56	277991	1089	992044	41	285947	1130	714053	4
57	278644	1087	992020	41	286624	1128	713376	3
58	279297	1086	991996	41	287301	1126	712699	2
59	279948	1084	991971	41	287977	1125	712023	1
60	280599	1082	991947	41	288652	1123	711348	0

Cosine

Sine

Cotang.

Tang.

M.

M.	Sine	D.	Cosine	D.	Tang.	D.	Cotang.	
0	9-280599	1082	9-991947	41	9-288652	1123	10-711348	60
1	281248	1081	991922	41	289326	1122	710674	59
2	281897	1079	991897	41	289999	1120	710001	58
3	282544	1077	991873	41	290671	1118	709329	57
4	283190	1076	991848	41	291342	1117	708658	56
5	283836	1074	991823	41	292013	1115	707987	55
6	284480	1072	991799	41	292682	1114	707318	54
7	285124	1071	991774	42	293350	1112	706650	53
8	285766	1069	991749	42	294017	1111	705983	52
9	286408	1067	991724	42	294684	1109	705316	51
10	287048	1066	991699	42	295349	1107	704651	50
11	9-287687	1064	9-991674	42	9-296013	1106	10-703987	49
12	288326	1063	991649	42	296677	1104	703323	48
13	288964	1061	991624	42	297339	1103	702661	47
14	289600	1059	991599	42	298001	1101	701999	46
15	290236	1058	991574	42	298662	1100	701338	45
16	290870	1056	991549	42	299322	1098	700678	44
17	291504	1054	991524	42	299980	1096	700020	43
18	292137	1053	991498	42	300638	1095	699362	42
19	292768	1051	991473	42	301295	1093	698705	41
20	293399	1050	991448	42	301951	1092	698049	40
21	9-294029	1048	9-991422	42	9-302607	1090	10-697393	39
22	294658	1046	991397	42	303261	1089	696739	38
23	295286	1045	991372	43	303914	1087	696086	37
24	295913	1043	991346	43	304567	1086	695433	36
25	296539	1042	991321	43	305218	1084	694782	35
26	297164	1040	991295	43	305869	1083	694131	34
27	297788	1039	991270	43	306519	1081	693481	33
28	298412	1037	991244	43	307168	1080	692832	32
29	299034	1036	991218	43	307815	1078	692185	31
30	299655	1034	991193	43	308463	1077	691537	30
31	9-300276	1032	9-991167	43	9-309109	1075	10-690891	29
32	300895	1031	991141	43	309754	1074	690246	28
33	301514	1029	991115	43	310398	1073	689602	27
34	302132	1028	991090	43	311042	1071	688958	26
35	302748	1026	991064	43	311685	1070	688315	25
36	303364	1025	991038	43	312327	1068	687673	24
37	303979	1023	991012	43	312967	1067	687033	23
38	304593	1022	990986	43	313608	1065	686392	22
39	305207	1020	990960	43	314247	1064	685753	21
40	305819	1019	990934	44	314885	1062	685115	20
41	9-306430	1017	9-990908	44	9-315523	1061	10-684477	19
42	307041	1016	990882	44	316159	1060	683841	18
43	307650	1014	990855	44	316795	1058	683205	17
44	308259	1013	990829	44	317430	1057	682570	16
45	308867	1011	990803	44	318064	1055	681936	15
46	309474	1010	990777	44	318697	1054	681303	14
47	310080	1008	990750	44	319329	1053	680671	13
48	310685	1007	990724	44	319961	1051	680039	12
49	311289	1005	990697	44	320592	1050	679408	11
50	311893	1004	990671	44	321222	1048	678778	10
51	9-312495	1003	9-990644	44	9-321851	1047	10-678149	9
52	313097	1001	990618	44	322479	1045	677521	8
53	313698	1000	990591	44	323106	1044	676894	7
54	314297	998	990565	44	323733	1043	676267	6
55	314897	997	990538	44	324358	1041	675642	5
56	315495	996	990511	45	324983	1040	675017	4
57	316092	994	990485	45	325607	1039	674393	3
58	316689	993	990458	45	326231	1037	673769	2
59	317284	991	990431	45	326853	1036	673147	1
60	317879	990	990404	45	327475	1035	672525	0
	Cosine		Sine		Cotang.		Tang.	M.

M.	Sine	D.	Cosine	D.	Tang.	D.	Cotang.	
0	9.317879	990	9.990404	45	9.327474	1035	10.672526	60
1	318473	988	990378	45	328095	1033	671905	59
2	319066	987	990351	45	328715	1032	671285	58
3	319658	986	990324	45	329334	1030	670666	57
4	320249	984	990297	45	329953	1029	670047	56
5	320840	983	990270	45	330570	1028	669430	55
6	321430	982	990243	45	331187	1026	668813	54
7	322019	980	990215	45	331803	1025	668197	53
8	322607	979	990188	45	332418	1024	667582	52
9	323194	977	990161	45	333033	1023	666967	51
10	323780	976	990134	45	333646	1021	666354	50
11	9.324366	975	9.990107	46	9.334259	1020	10.665741	49
12	324950	973	990079	46	334871	1019	665129	48
13	325534	972	990052	46	335482	1017	664518	47
14	326117	970	990025	46	336093	1016	663907	46
15	326700	969	989997	46	336702	1015	663298	45
16	327281	968	989970	46	337311	1013	662689	44
17	327862	966	989942	46	337919	1012	662081	43
18	328442	965	989915	46	338527	1011	661473	42
19	329021	964	989887	46	339133	1010	660867	41
20	329599	962	989860	46	339739	1008	660261	40
21	9.330176	961	9.989832	46	9.340344	1007	10.659656	39
22	330753	960	989804	46	340948	1006	659052	38
23	331329	958	989777	46	341552	1004	658448	37
24	331903	957	989749	47	342155	1003	657845	36
25	332478	956	989721	47	342757	1002	657243	35
26	333051	954	989693	47	343358	1000	656642	34
27	333624	953	989665	47	343958	999	656042	33
28	334195	952	989637	47	344558	998	655442	32
29	334766	950	989609	47	345157	997	654843	31
30	335337	949	989582	47	345755	996	654245	30
31	9.335906	948	9.989553	47	9.346353	994	10.653647	29
32	336475	946	989525	47	346949	993	653051	28
33	337043	945	989497	47	347545	992	652455	27
34	337610	944	989469	47	348141	991	651859	26
35	338176	943	989441	47	348735	990	651265	25
36	338742	941	989413	47	349329	988	650671	24
37	339306	940	989384	47	349922	987	650078	23
38	339871	939	989356	47	350514	986	649486	22
39	340434	937	989328	47	351106	985	648894	21
40	340996	936	989300	47	351697	983	648303	20
41	9.341558	935	9.989271	47	9.352287	982	10.647713	19
42	342119	934	989243	47	352876	981	647124	18
43	342679	932	989214	47	353465	980	646535	17
44	343239	931	989186	47	354053	979	645947	16
45	343797	930	989157	47	354640	977	645360	15
46	344355	929	989128	48	355227	976	644773	14
47	344912	927	989100	48	355813	975	644187	13
48	345469	926	989071	48	356398	974	643602	12
49	346024	925	989042	48	356982	973	643018	11
50	346579	924	989014	48	357566	971	642434	10
51	9.347134	922	9.988985	48	9.358149	970	10.641851	9
52	347687	921	988956	48	358731	969	641269	8
53	348240	920	988927	48	359313	968	640687	7
54	348792	919	988898	48	359893	967	640107	6
55	349343	917	988869	48	360474	966	639526	5
56	349893	916	988840	48	361053	965	638947	4
57	350443	915	988811	49	361632	963	638368	3
58	350992	914	988782	49	362210	962	637790	2
59	351540	913	988753	49	362787	961	637213	1
60	352088	911	988724	49	363364	960	636636	0
	Cosine		Sine		Cotang.		Tang.	M.

M.	Sine	D.	Cosine	D.	Tang.	D.	Cotang.	
0	9352088	911	9986724	49	9363364	960	10636636	60
1	352635	910	988695	49	363940	959	636060	59
2	353181	909	988666	49	364515	958	635485	58
3	353726	908	988636	49	365090	957	634910	57
4	354271	907	988607	49	365664	955	634336	56
5	354815	905	988578	49	366237	954	633763	55
6	355358	904	988548	49	366810	953	633190	54
7	355901	903	988519	49	367382	952	632618	53
8	356443	902	988489	49	367953	951	632047	52
9	356984	901	988460	49	368524	950	631476	51
10	357524	899	988430	49	369094	949	630906	50
11	9358064	898	9988401	49	9369663	948	10630337	49
12	358603	897	988371	49	370232	946	629768	48
13	359141	896	988342	49	370799	945	629201	47
14	359678	895	988312	50	371367	944	628633	46
15	360215	893	988282	50	371933	943	628067	45
16	360752	892	988252	50	372499	942	627501	44
17	361287	891	988223	50	373064	941	626936	43
18	361822	890	988193	50	373629	940	626371	42
19	362356	889	988163	50	374193	939	625807	41
20	362889	888	988133	50	374756	938	625244	40
21	9363422	887	9988103	50	9375319	937	10624681	39
22	363954	885	988073	50	375881	935	624119	38
23	364485	884	988043	50	376442	934	623558	37
24	365016	883	988013	50	377003	933	622997	36
25	365546	882	987983	50	377563	932	622437	35
26	366075	881	987953	50	378122	931	621878	34
27	366604	880	987922	50	378681	930	621319	33
28	367131	879	987892	50	379239	929	620761	32
29	367659	877	987862	50	379797	928	620203	31
30	368185	876	987832	51	380354	927	619646	30
31	9368711	875	9987801	51	9380910	926	10619090	29
32	369236	874	987771	51	381466	925	618534	28
33	369761	873	987740	51	382020	924	617980	27
34	370285	872	987710	51	382575	923	617425	26
35	370808	871	987679	51	383129	922	616871	25
36	371330	870	987649	51	383682	921	616318	24
37	371852	869	987618	51	384234	920	615766	23
38	372373	867	987588	51	384786	919	615214	22
39	372894	866	987557	51	385337	918	614663	21
40	373414	865	987526	51	385888	917	614112	20
41	9373933	864	9987496	51	9386438	915	10613562	19
42	374452	863	987465	51	386987	914	613013	18
43	374970	862	987434	51	387536	913	612464	17
44	375487	861	987403	52	388084	912	611916	16
45	376003	860	987372	52	388631	911	611369	15
46	376519	859	987341	52	389178	910	610822	14
47	377035	858	987310	52	389724	909	610276	13
48	377549	857	987279	52	390270	908	609730	12
49	378063	856	987248	52	390815	907	609185	11
50	378577	854	987217	52	391360	906	608640	10
51	9379089	853	9987186	52	9391903	905	10608097	9
52	379601	852	987155	52	392447	904	607553	8
53	380113	851	987124	52	392989	903	607011	7
54	380624	850	987092	52	393531	902	606469	6
55	381134	849	987061	52	394073	901	605927	5
56	381643	848	987030	52	394614	900	605386	4
57	382152	847	986998	52	395154	899	604846	3
58	382661	846	986967	52	395694	898	604306	2
59	383168	845	986936	52	396233	897	603767	1
60	383675	844	986904	52	396771	896	603229	0
	Cosine		Sine		Cotang.		Tang.	M.

M.	Sine	D.	Cosine	D.	Tang.	D.	Cotang.	
* 0	9.383675	844	9.986904	52	9.396771	896	10.603229	60
1	384182	843	986873	53	397309	896	602691	59
2	384687	842	986841	53	397846	895	602154	58
3	385192	841	986809	53	398383	894	601617	57
4	385697	840	986778	53	398919	893	601081	56
5	386201	839	986746	53	399455	892	600545	55
6	386704	838	986714	53	399990	891	600010	54
7	387207	837	986683	53	400524	890	599476	53
8	387709	836	986651	53	401058	889	598942	52
9	388210	835	986619	53	401591	888	598409	51
10	388711	834	986587	53	402124	887	597876	50
11	9.389211	833	9.986555	53	9.402656	886	10.597344	49
12	389711	832	986523	53	403187	885	596813	48
13	390210	831	986491	53	403718	884	596282	47
14	390708	830	986459	53	404249	883	595751	46
15	391206	828	986427	53	404778	882	595222	45
16	391703	827	986395	53	405308	881	594692	44
17	392199	826	986363	54	405836	880	594164	43
18	392695	825	986331	54	406364	879	593636	42
19	393191	824	986299	54	406892	878	593108	41
20	393685	823	986266	54	407419	877	592581	40
21	9.394179	822	9.986234	54	9.407945	876	10.592055	39
22	394673	821	986202	54	408471	875	591529	38
23	395166	820	986169	54	408997	874	591003	37
24	395658	819	986137	54	409521	874	590479	36
25	396150	818	986104	54	410045	873	589955	35
26	396641	817	986072	54	410569	872	589431	34
27	397132	817	986039	54	411092	871	588908	33
28	397621	816	986007	54	411615	870	588385	32
29	398111	815	985974	54	412137	869	587863	31
30	398600	814	985942	54	412658	868	587342	30
31	9.399088	813	9.985909	55	9.413179	867	10.586821	29
32	399575	812	985876	55	413699	866	586301	28
33	400062	811	985843	55	414219	865	585781	27
34	400549	810	985811	55	414738	864	585262	26
35	401035	809	985778	55	415257	864	584743	25
36	401520	808	985745	55	415775	863	584225	24
37	402005	807	985712	55	416293	862	583707	23
38	402489	806	985679	55	416810	861	583190	22
39	402972	805	985646	55	417326	860	582674	21
40	403455	804	985613	55	417842	859	582158	20
41	9.403938	803	9.985580	55	9.418358	858	10.581642	19
42	404420	802	985547	55	418873	857	581127	18
43	404901	801	985514	55	419387	856	580613	17
44	405382	800	985480	55	419901	855	580099	16
45	405862	799	985447	55	420415	855	579585	15
46	406341	798	985414	56	420927	854	579073	14
47	406820	797	985380	56	421440	853	578560	13
48	407299	796	985347	56	421952	852	578048	12
49	407777	795	985314	56	422463	851	577537	11
50	408254	794	985280	56	422974	850	577026	10
51	9.408731	794	9.985247	56	9.423484	849	10.576516	9
52	409207	793	985213	56	423993	848	576007	8
53	409682	792	985180	56	424503	848	575497	7
54	410157	791	985146	56	425011	847	574989	6
55	410632	790	985113	56	425519	846	574481	5
56	411106	789	985079	56	426027	845	573973	4
57	411579	788	985045	56	426534	844	573466	3
58	412052	787	985011	56	427041	843	572959	2
59	412524	786	984978	56	427547	843	572453	1
60	412996	785	984944	56	428052	842	571948	0
	Cosine		Sine		Cotang.		Tang.	M.

M.	Sine	D.	Cosine	D.	Tang.	D.	Cotang.	
0	9-412996	785	9-984944	57	9-428052	842	10-571948	60
1	413467	784	984910	57	428557	841	571443	59
2	413938	783	984876	57	429062	840	570938	58
3	414408	783	984842	57	429566	839	570434	57
4	414878	782	984808	57	430070	838	569930	56
5	415347	781	984774	57	430573	838	569427	55
6	415815	780	984740	57	431075	837	568925	54
7	416283	779	984706	57	431577	836	568423	53
8	416751	778	984672	57	432079	835	567921	52
9	417217	777	984637	57	432580	834	567420	51
10	417684	776	984603	57	433080	833	566920	50
11	9-418150	775	9-984569	57	9-433580	832	10-566420	49
12	418615	774	984535	57	434080	832	565920	48
13	419079	773	984500	57	434579	831	565421	47
14	419544	773	984466	57	435078	830	564922	46
15	420007	772	984432	58	435576	829	564424	45
16	420470	771	984397	58	436073	828	563927	44
17	420933	770	984363	58	436570	828	563430	43
18	421395	769	984328	58	437067	827	562933	42
19	421857	768	984294	58	437563	826	562437	41
20	422318	767	984259	58	438059	825	561941	40
21	9-422778	767	9-984224	58	9-438554	824	10-561446	39
22	423238	766	984190	58	439048	823	560952	38
23	423697	765	984155	58	439543	823	560457	37
24	424156	764	984120	58	440036	822	559964	36
25	424615	763	984085	58	440529	821	559471	35
26	425073	762	984050	58	441022	820	558978	34
27	425530	761	984015	58	441514	819	558486	33
28	425987	760	983981	58	442006	819	557994	32
29	426443	760	983946	58	442497	818	557503	31
30	426899	759	983911	58	442988	817	557012	30
31	9-427354	758	9-983875	58	9-443479	816	10-556521	29
32	427809	757	983840	59	443968	816	556032	28
33	428263	756	983805	59	444458	815	555542	27
34	428717	755	983770	59	444947	814	555053	26
35	429170	754	983735	59	445435	813	554565	25
36	429623	753	983700	59	445923	812	554077	24
37	430075	752	983664	59	446411	812	553589	23
38	430527	752	983629	59	446898	811	553102	22
39	430978	751	983594	59	447384	810	552616	21
40	431429	750	983558	59	447870	809	552130	20
41	9-431879	749	9-983523	59	9-448356	809	10-551644	19
42	432329	749	983487	59	448841	808	551159	18
43	432778	748	983452	59	449326	807	550674	17
44	433226	747	983416	59	449810	806	550190	16
45	433675	746	983381	59	450294	806	549706	15
46	434122	745	983345	59	450777	805	549223	14
47	434569	744	983309	59	451260	804	548740	13
48	435016	744	983273	60	451743	803	548257	12
49	435462	743	983238	60	452225	802	547775	11
50	435908	742	983202	60	452706	802	547294	10
51	9-436353	741	9-983166	60	9-453187	801	10-546813	9
52	436798	740	983130	60	453668	800	546332	8
53	437242	740	983094	60	454148	799	545852	7
54	437686	739	983058	60	454628	799	545372	6
55	438129	738	983022	60	455107	798	544893	5
56	438572	737	982986	60	455586	797	544414	4
57	439014	736	982950	60	456064	796	543936	3
58	439456	736	982914	60	456542	796	543458	2
59	439897	735	982878	60	457019	795	542981	1
60	440338	734	982842	60	457496	794	542504	0
	Cosine		Sine		Cotang.		Tang.	M.

M.	Sine	D.	Cosine	D.	Tang.	D.	Cotang.	
0	9.440338	734	9.982842	60	9.457496	794	10.542504	60
1	440778	733	982805	60	457973	793	542027	59
2	441218	732	982769	61	458449	793	541551	58
3	441658	731	982733	61	458925	792	541075	57
4	442096	731	982696	61	459400	791	540600	56
5	442535	730	982660	61	459875	790	540125	55
6	442973	729	982624	61	460349	790	539651	54
7	443410	728	982587	61	460823	789	539177	53
8	443847	727	982551	61	461297	788	538703	52
9	444284	727	982514	61	461770	788	538230	51
10	444720	726	982477	61	462242	787	537758	50
11	9.445155	725	9.982441	61	9.462714	786	10.537286	49
12	445590	724	982404	61	463186	785	536814	48
13	446025	723	982367	61	463658	785	536342	47
14	446459	723	982331	61	464129	784	535871	46
15	446893	722	982294	61	464599	783	535401	45
16	447326	721	982257	61	465069	783	534931	44
17	447759	720	982220	62	465539	782	534461	43
18	448191	720	982183	62	466008	781	533992	42
19	448623	719	982146	62	466476	780	533524	41
20	449054	718	982109	62	466945	780	533055	40
21	9.449485	717	9.982072	62	9.467413	779	10.532587	39
22	449915	716	982035	62	467880	778	532120	38
23	450345	716	981998	62	468347	778	531653	37
24	450775	715	981961	62	468814	777	531186	36
25	451204	714	981924	62	469280	776	530720	35
26	451632	713	981886	62	469746	775	530254	34
27	452060	713	981849	62	470211	775	529789	33
28	452488	712	981812	62	470676	774	529324	32
29	452915	711	981774	62	471141	773	528859	31
30	453342	710	981737	62	471605	773	528395	30
31	9.453768	710	9.981699	63	9.472068	772	10.527932	29
32	454194	709	981662	63	472532	771	527468	28
33	454619	708	981625	63	472995	771	527005	27
34	455044	707	981587	63	473457	770	526543	26
35	455469	707	981549	63	473919	769	526081	25
36	455893	706	981512	63	474381	769	525619	24
37	456316	705	981474	63	474842	768	525158	23
38	456739	704	981436	63	475303	767	524697	22
39	457162	704	981399	63	475763	767	524237	21
40	457584	703	981361	63	476223	766	523777	20
41	9.458006	702	9.981323	63	9.476683	765	10.523317	19
42	458427	701	981285	63	477142	765	522858	18
43	458848	701	981247	63	477601	764	522399	17
44	459268	700	981209	63	478059	763	521941	16
45	459688	699	981171	63	478517	763	521483	15
46	460108	698	981133	64	478975	762	521025	14
47	460527	698	981095	64	479432	761	520568	13
48	460946	697	981057	64	479889	761	520111	12
49	461364	696	981019	64	480345	760	519655	11
50	461782	695	980981	64	480801	759	519199	10
51	9.462199	695	9.980942	64	9.481257	759	10.518743	9
52	462616	694	980904	64	481712	758	518288	8
53	463032	693	980866	64	482167	757	517833	7
54	463448	693	980827	64	482621	757	517379	6
55	463864	692	980789	64	483075	756	516925	5
56	464279	691	980750	64	483529	755	516471	4
57	464694	690	980712	64	483982	755	516018	3
58	465108	690	980673	64	484435	754	515565	2
59	465522	689	980635	64	484887	753	515113	1
60	465935	688	980596	64	485339	753	514661	0
	Cosine		Sine		Cotang.		Tang.	M.

M.	Sine	D.	Cosine	D.	Tang.	D.	Cotang.	
0	9-465935	688	9-980596	64	9-485339	755	10-514061	60
1	466348	688	980558	64	485791	752	514209	59
2	466761	687	980519	65	486242	751	513758	58
3	467173	686	980480	65	486693	751	513307	57
4	467585	685	980442	65	487143	750	512857	56
5	467996	685	980403	65	487593	749	512407	55
6	468407	684	980364	65	488043	749	511957	54
7	468817	683	980325	65	488492	748	511508	53
8	469227	683	980286	65	488941	747	511059	52
9	469637	682	980247	65	489390	747	510610	51
10	470046	681	980208	65	489838	746	510162	50
11	9-470455	680	9-980169	65	9-490286	746	10-509714	49
12	470863	680	980130	65	490733	745	509267	48
13	471271	679	980091	65	491180	744	508820	47
14	471679	678	980052	65	491627	744	508373	46
15	472086	678	980012	65	492073	743	507927	45
16	472492	677	979973	65	492519	743	507481	44
17	472898	676	979934	66	492965	742	507035	43
18	473304	676	979895	66	493410	741	506590	42
19	473710	675	979855	66	493854	740	506146	41
20	474115	674	979816	66	494299	740	505701	40
21	9-474519	674	9-979776	66	9-494743	740	10-505257	39
22	474923	673	979737	66	495186	739	504814	38
23	475327	672	979697	66	495630	738	504370	37
24	475730	672	979658	66	496073	737	503927	36
25	476133	671	979618	66	496515	737	503485	35
26	476536	670	979579	66	496957	736	503043	34
27	476938	669	979539	66	497399	736	502601	33
28	477340	669	979499	66	497841	735	502159	32
29	477741	668	979459	66	498282	734	501718	31
30	478142	667	979420	66	498722	734	501278	30
31	9-478542	667	9-979380	66	9-499163	733	10-500837	29
32	478942	666	979340	66	499603	733	500397	28
33	479342	665	979300	67	500042	732	499958	27
34	479741	665	979260	67	500481	731	499519	26
35	480140	664	979220	67	500920	731	499080	25
36	480539	663	979180	67	501359	730	498641	24
37	480937	663	979140	67	501797	730	498203	23
38	481334	662	979100	67	502235	729	497765	22
39	481731	661	979059	67	502672	728	497328	21
40	482128	661	979019	67	503109	728	496891	20
41	9-482525	660	9-978979	67	9-503546	727	10-496454	19
42	482921	659	978939	67	503982	727	496018	18
43	483316	659	978898	67	504418	726	495582	17
44	483712	658	978858	67	504854	725	495146	16
45	484107	657	978817	67	505289	725	494711	15
46	484501	657	978777	67	505724	724	494276	14
47	484895	656	978736	67	506159	724	493841	13
48	485289	655	978696	68	506593	723	493407	12
49	485682	655	978655	68	507027	722	492973	11
50	486075	654	978615	68	507460	722	492540	10
51	9-486467	653	9-978574	68	9-507893	721	10-492107	9
52	486860	653	978533	68	508326	721	491674	8
53	487251	652	978493	68	508759	720	491241	7
54	487643	651	978452	68	509191	719	490809	6
55	488034	651	978411	68	509622	719	490378	5
56	488424	650	978370	68	510054	718	489946	4
57	488814	650	978329	68	510485	718	489515	3
58	489204	649	978288	68	510916	717	489084	2
59	489593	648	978247	68	511346	716	488654	1
60	489982	648	978206	68	511776	716	488224	0
	Cosine		Sine		Cotang.		Tang.	M.

M.	Sine	D.	Cosine	D.	Tang.	D.	Cotang.	
0	9.489982	648	9.978206	68	9.511776	716	10.488224	60
1	490371	648	978165	68	512206	716	487794	59
2	490759	647	978124	68	512635	715	487365	58
3	491147	646	978083	69	513064	714	486936	57
4	491535	646	978042	69	513493	714	486507	56
5	491922	645	978001	69	513921	713	486079	55
6	492308	644	977959	69	514349	713	485651	54
7	492695	644	977918	69	514777	712	485223	53
8	493081	643	977877	69	515204	712	484796	52
9	493466	642	977835	69	515631	711	484369	51
10	493851	642	977794	69	516057	710	483943	50
11	9.494236	641	9.977752	69	9.516484	710	10.483516	49
12	494621	641	977711	69	516910	709	483090	48
13	495005	640	977669	69	517335	709	482665	47
14	495388	639	977628	69	517761	708	482239	46
15	495772	639	977586	69	518185	708	481815	45
16	496154	638	977544	70	518610	707	481390	44
17	496537	637	977503	70	519034	706	480966	43
18	496919	637	977461	70	519458	706	480542	42
19	497301	636	977419	70	519882	705	480118	41
20	497682	636	977377	70	520305	705	479695	40
21	9.498064	635	9.977335	70	9.520728	704	10.479272	39
22	498444	634	977293	70	521151	703	478849	38
23	498825	634	977251	70	521573	703	478427	37
24	499204	633	977209	70	521995	703	478005	36
25	499584	632	977167	70	522417	702	477583	35
26	499963	632	977125	70	522838	702	477162	34
27	500342	631	977083	70	523259	701	476741	33
28	500721	631	977041	70	523680	701	476320	32
29	501099	630	976999	70	524100	700	475900	31
30	501476	629	976957	70	524520	699	475480	30
31	9.501854	629	9.976914	70	9.524939	699	10.475061	29
32	502231	628	976872	71	525359	698	474641	28
33	502607	628	976830	71	525778	698	474222	27
34	502984	627	976787	71	526197	697	473803	26
35	503360	626	976745	71	526615	697	473385	25
36	503735	626	976702	71	527033	696	472967	24
37	504110	625	976660	71	527451	696	472549	23
38	504485	625	976617	71	527868	695	472132	22
39	504860	624	976574	71	528285	695	471715	21
40	505234	623	976532	71	528702	694	471298	20
41	9.505608	623	9.976489	71	9.529119	693	10.470881	19
42	505981	622	976446	71	529535	693	470465	18
43	506354	622	976404	71	529950	693	470050	17
44	506727	621	976361	71	530366	692	469634	16
45	507099	620	976318	71	530781	691	469219	15
46	507471	620	976275	71	531196	691	468804	14
47	507843	619	976232	72	531611	690	468389	13
48	508214	619	976189	72	532025	690	467975	12
49	508585	618	976146	72	532439	689	467561	11
50	508956	618	976103	72	532853	689	467147	10
51	9.509326	617	9.976060	72	9.533266	688	10.466734	9
52	509696	616	976017	72	533679	688	466321	8
53	510065	616	975974	72	534092	687	465908	7
54	510434	615	975930	72	534504	687	465496	6
55	510803	615	975887	72	534916	686	465084	5
56	511172	614	975844	72	535328	686	464672	4
57	511540	613	975800	72	535739	685	464261	3
58	511907	613	975757	72	536150	685	463850	2
59	512275	612	975714	72	536561	684	463439	1
60	512642	612	975670	72	536972	684	463028	0
	Cosine		Sine		Cotang.		Tang.	M.

M.	Sine	D.	Cosine	D.	Tang.	D.	Cotang.	
0	9-512642	612	9-975670	73	9-536972	684	10-463028	60
1	513009	611	975627	73	537382	683	462618	59
2	513375	611	975583	73	537792	683	462208	58
3	513741	610	975539	73	538202	682	461798	57
4	514107	609	975495	73	538611	682	461389	56
5	514472	609	975452	73	539020	681	460980	55
6	514837	608	975408	73	539429	681	460571	54
7	515202	608	975365	73	539837	680	460163	53
8	515566	607	975321	73	540245	680	459755	52
9	515930	607	975277	73	540653	679	459347	51
10	516294	606	975233	73	541061	679	458939	50
11	9-516657	605	9-975189	73	9-541468	678	10-458532	49
12	517020	605	975145	73	541875	678	458125	48
13	517382	604	975101	73	542281	677	457719	47
14	517745	604	975057	73	542688	677	457312	46
15	518107	603	975013	73	543094	676	456906	45
16	518468	603	974969	74	543499	676	456501	44
17	518829	602	974925	74	543905	675	456095	43
18	519190	601	974880	74	544310	675	455690	42
19	519551	601	974836	74	544715	674	455285	41
20	519911	600	974792	74	545119	674	454881	40
21	9-520271	600	9-974748	74	9-545524	673	10-454476	39
22	520631	599	974703	74	545928	673	454072	38
23	520990	599	974659	74	546331	672	453669	37
24	521349	598	974614	74	546735	672	453265	36
25	521707	598	974570	74	547138	671	452862	35
26	522066	597	974525	74	547540	671	452460	34
27	522424	596	974481	74	547943	670	452057	33
28	522781	596	974436	74	548345	670	451655	32
29	523138	595	974391	74	548747	669	451253	31
30	523495	595	974347	75	549149	669	450851	30
31	9-523852	594	9-974302	75	9-549550	668	10-450450	29
32	524208	594	974257	75	549951	668	450049	28
33	524564	593	974212	75	550352	667	449648	27
34	524920	593	974167	75	550752	667	449248	26
35	525275	592	974122	75	551152	666	448848	25
36	525630	591	974077	75	551552	666	448448	24
37	525984	591	974032	75	551952	665	448048	23
38	526339	590	973987	75	552351	665	447649	22
39	526693	590	973942	75	552750	665	447250	21
40	527046	589	973897	75	553149	664	446851	20
41	9-527400	589	9-973852	75	9-553548	664	10-446452	19
42	527753	588	973807	75	553946	663	446054	18
43	528105	588	973761	75	554344	663	445656	17
44	528458	587	973716	76	554741	662	445259	16
45	528810	587	973671	76	555139	662	444861	15
46	529161	586	973625	76	555536	661	444464	14
47	529513	586	973580	76	555933	661	444067	13
48	529864	585	973535	76	556329	660	443671	12
49	530215	585	973489	76	556725	660	443275	11
50	530565	584	973444	76	557121	659	442879	10
51	9-530915	584	9-973398	76	9-557517	659	10-442483	9
52	531265	583	973352	76	557913	659	442087	8
53	531614	582	973307	76	558308	658	441692	7
54	531963	582	973261	76	558702	658	441298	6
55	532312	581	973215	76	559097	657	440903	5
56	532661	581	973169	76	559491	657	440509	4
57	533009	580	973124	76	559885	656	440115	3
58	533357	580	973078	76	560279	656	439721	2
59	533704	579	973032	77	560673	655	439327	1
60	534052	578	972986	77	561066	655	438934	0
	Cosine		Sine		Cotang.		Tang.	M.

M.	Sine	D.	Cosine	D.	Tang.	D.	Cotang.	
0	9.534052	578	9.972986	77	9.561066	655	10.438934	60
1	534399	577	972940	77	561459	654	438541	59
2	534745	577	972894	77	561851	654	438149	58
3	535092	577	972848	77	562244	653	437756	57
4	535438	576	972802	77	562636	653	437364	56
5	535783	576	972755	77	563028	653	436972	55
6	536129	575	972709	77	563419	652	436581	54
7	536474	574	972663	77	563811	652	436189	53
8	536818	574	972617	77	564202	651	435798	52
9	537163	573	972570	77	564592	651	435408	51
10	537507	573	972524	77	564983	650	435017	50
11	9.537851	572	9.972478	77	9.565373	650	10.434627	49
12	538194	572	972431	78	565763	649	434237	48
13	538538	571	972385	78	566153	649	433847	47
14	538880	571	972338	78	566542	649	433458	46
15	539223	570	972291	78	566932	648	433068	45
16	539565	570	972245	78	567320	648	432680	44
17	539907	569	972198	78	567709	647	432291	43
18	540249	569	972151	78	568098	647	431902	42
19	540590	568	972105	78	568486	646	431514	41
20	540931	568	972058	78	568873	646	431127	40
21	9.541272	567	9.972011	78	9.569261	645	10.430739	39
22	541613	567	971964	78	569648	645	430352	38
23	541953	566	971917	78	570035	645	429965	37
24	542293	566	971870	78	570422	644	429578	36
25	542632	565	971823	78	570809	644	429191	35
26	542971	565	971776	78	571195	643	428805	34
27	543310	564	971729	79	571581	643	428419	33
28	543649	564	971682	79	571967	642	428033	32
29	543987	563	971635	79	572352	642	427648	31
30	544325	563	971588	79	572738	642	427262	30
31	9.544663	562	9.971540	79	9.573123	641	10.426877	29
32	545000	562	971493	79	573507	641	426493	28
33	545338	561	971446	79	573892	640	426108	27
34	545674	561	971398	79	574276	640	425724	26
35	546011	560	971351	79	574660	639	425340	25
36	546347	560	971303	79	575044	639	424956	24
37	546683	559	971256	79	575427	639	424573	23
38	547019	559	971208	79	575810	638	424190	22
39	547354	558	971161	79	576193	638	423807	21
40	547689	558	971113	79	576576	637	423424	20
41	9.548024	557	9.971066	80	9.576958	637	10.423041	19
42	548359	557	971018	80	577341	636	422659	18
43	548693	556	970970	80	577723	636	422277	17
44	549027	556	970922	80	578104	636	421896	16
45	549360	555	970874	80	578486	635	421514	15
46	549693	555	970827	80	578867	635	421133	14
47	550026	554	970779	80	579248	634	420752	13
48	550359	554	970731	80	579629	634	420371	12
49	550692	553	970683	80	580009	634	419991	11
50	551024	553	970635	80	580389	633	419611	10
51	9.551356	552	9.970586	80	9.580769	633	10.419231	9
52	551687	552	970538	80	581149	632	418851	8
53	552018	552	970490	80	581528	632	418472	7
54	552349	551	970442	80	581907	632	418093	6
55	552680	551	970394	80	582286	631	417714	5
56	553010	550	970345	81	582665	631	417335	4
57	553341	550	970297	81	583043	630	416957	3
58	553670	549	970249	81	583422	630	416578	2
59	554000	549	970200	81	583800	629	416200	1
60	554329	548	970152	81	584177	629	415823	0
	Cosine		Sine		Cotang.		Tang.	M.

M.	Sine	D.	Cosine	D.	Tang.	D.	Cotang.	
0	9-554329	548	9-970152	81	9-584177	629	10-415823	60
1	554658	548	970103	81	584555	629	415445	59
2	554987	547	960055	81	584932	628	415068	58
3	555315	547	970006	81	585309	628	414691	57
4	555643	546	969957	81	585686	627	414314	56
5	555971	546	969909	81	586062	627	413938	55
6	556299	545	969860	81	586439	627	413561	54
7	556626	545	969811	81	586815	626	413185	53
8	556953	544	969762	81	587190	626	412810	52
9	557280	544	969714	81	587566	625	412434	51
10	557606	543	969665	81	587941	625	412059	50
11	9-557932	543	9-969616	82	9-588316	625	10-411684	49
12	558258	543	969567	82	588691	624	411309	48
13	558583	542	969518	82	589066	624	410934	47
14	558909	542	969469	82	589440	623	410560	46
15	559234	541	969420	82	589814	623	410186	45
16	559558	541	969370	82	590188	623	409812	44
17	559883	540	969321	82	590562	622	409438	43
18	560207	540	969272	82	590935	622	409065	42
19	560531	539	969223	82	591308	622	408692	41
20	560855	539	969173	82	591681	621	408319	40
21	9-561178	538	9-969124	82	9-592054	621	10-407946	39
22	561501	538	969075	82	592426	620	407574	38
23	561824	537	969025	82	592798	620	407202	37
24	562146	537	968976	82	593170	619	406829	36
25	562468	536	968926	83	593542	619	406458	35
26	562790	536	968877	83	593914	618	406086	34
27	563112	536	968827	83	594285	618	405715	33
28	563433	535	968777	83	594656	618	405344	32
29	563755	535	968728	83	595027	617	404973	31
30	564075	534	968678	83	595398	617	404602	30
31	9-564396	534	9-968628	83	9-595768	617	10-404232	29
32	564716	533	968578	83	596138	616	403862	28
33	565036	533	968528	83	596508	616	403492	27
34	565356	532	968479	83	596878	616	403122	26
35	565676	532	968429	83	597247	615	402753	25
36	565995	531	968379	83	597616	615	402384	24
37	566314	531	968329	83	597985	615	402015	23
38	566632	531	968278	83	598354	614	401646	22
39	566951	530	968228	84	598722	614	401278	21
40	567269	530	968178	84	599091	613	400909	20
41	9-567587	529	9-968128	84	9-599459	613	10-400541	19
42	567904	529	968078	84	599827	613	400173	18
43	568222	528	968027	84	600194	612	399806	17
44	568539	528	967977	84	600562	612	399438	16
45	568856	528	967927	84	600929	611	399071	15
46	569172	527	967876	84	601296	611	398704	14
47	569488	527	967826	84	601662	611	398338	13
48	569804	526	967775	84	602029	610	397971	12
49	570120	526	967725	84	602395	610	397605	11
50	570435	525	967674	84	602761	610	397239	10
51	9-570751	525	9-967624	84	9-603127	609	10-396873	9
52	571066	524	967573	84	603493	609	396507	8
53	571380	524	967522	85	603858	609	396142	7
54	571695	523	967471	85	604223	608	395777	6
55	572009	523	967421	85	604588	608	395412	5
56	572323	523	967370	85	604953	607	395047	4
57	572636	522	967319	85	605317	607	394683	3
58	572950	522	967268	85	605682	607	394318	2
59	573263	521	967217	85	606046	606	393954	1
60	573575	521	967166	85	606410	606	393590	0
	Cosine		Sine		Cotang.		Tang.	M.

M.	Sine	D.	Cosine	D.	Tang.	D.	Cotang.	
0	9.573575	521	9.967166	85	9.606410	606	10.393590	60
1	573888	520	967115	85	606773	606	393227	59
2	574200	520	967064	85	607137	605	392863	58
3	574512	519	967013	85	607500	605	392500	57
4	574824	519	966961	85	607863	604	392137	56
5	575136	519	966910	85	608225	604	391775	55
6	575447	518	966859	85	608588	604	391412	54
7	575758	518	966808	85	608950	603	391050	53
8	576069	517	966756	86	609312	603	390688	52
9	576379	517	966705	86	609674	603	390326	51
10	576689	516	966653	86	610036	602	389964	50
11	9.576999	516	9.966602	86	9.610397	602	10.389603	49
12	577309	516	966550	86	610759	602	389241	48
13	577618	515	966499	86	611120	601	388880	47
14	577927	515	966447	86	611480	601	388520	46
15	578236	514	966395	86	611841	601	388159	45
16	578545	514	966344	86	612201	600	387799	44
17	578853	513	966292	86	612561	600	387439	43
18	579162	513	966240	86	612921	600	387079	42
19	579470	513	966188	86	613281	599	386719	41
20	579777	512	966136	86	613641	599	386359	40
21	9.580085	512	9.966085	87	9.614000	598	10.386000	39
22	580392	511	966033	87	614359	598	385641	38
23	580699	511	965981	87	614718	598	385282	37
24	581005	511	965928	87	615077	597	384923	36
25	581312	510	965876	87	615435	597	384565	35
26	581618	510	965824	87	615793	597	384207	34
27	581924	509	965772	87	616151	596	383849	33
28	582229	509	965720	87	616509	596	383491	32
29	582535	509	965668	87	616867	596	383133	31
30	582840	508	965615	87	617224	595	382776	30
31	9.583145	508	9.965563	87	9.617582	595	10.382418	29
32	583449	507	965511	87	617939	595	382061	28
33	583754	507	965458	87	618295	594	381705	27
34	584058	506	965406	87	618652	594	381348	26
35	584361	506	965353	88	619008	594	380992	25
36	584665	506	965301	88	619364	593	380636	24
37	584968	505	965248	88	619721	593	380279	23
38	585272	505	965195	88	620076	593	379924	22
39	585574	504	965143	88	620432	592	379568	21
40	585877	504	965090	88	620787	592	379213	20
41	9.586179	503	9.965037	88	9.621142	592	10.378858	19
42	586482	503	964984	88	621497	591	378503	18
43	586783	503	964931	88	621852	591	378148	17
44	587085	502	964879	88	622207	590	377793	16
45	587386	502	964826	88	622561	590	377439	15
46	587688	501	964773	88	622915	590	377085	14
47	587989	501	964719	88	623269	589	376731	13
48	588289	501	964666	89	623623	589	376377	12
49	588590	500	964613	89	623976	589	376024	11
50	588890	500	964560	89	624330	588	375670	10
51	9.589190	499	9.964507	89	9.624683	588	10.375317	9
52	589489	499	964454	89	625036	588	374964	8
53	589789	499	964400	89	625388	587	374612	7
54	590088	498	964347	89	625741	587	374259	6
55	590387	498	964294	89	626093	587	373907	5
56	590686	497	964240	89	626445	586	373555	4
57	590984	497	964187	89	626797	586	373203	3
58	591282	497	964133	89	627149	586	372851	2
59	591580	496	964080	89	627501	585	372499	1
60	591878	496	964026	89	627852	585	372148	0
	Cosine		Sine		Cotang.		Tang.	

M.	Sine	D.	Cosine	D.	Tang.	D.	Cotang.	
0	9-591878	496	9-964026	89	9-627852	585	10-372148	60
1	592176	495	963972	89	628203	585	371797	59
2	592473	495	963919	89	628554	585	371446	58
3	592770	495	963865	90	628905	584	371095	57
4	593067	494	963811	90	629255	584	370745	56
5	593363	494	963757	90	629606	583	370394	55
6	593659	493	963704	90	629956	583	370044	54
7	593955	493	963650	90	630306	583	369694	53
8	594251	493	963596	90	630656	583	369344	52
9	594547	492	963542	90	631005	582	368995	51
10	594842	492	963488	90	631355	582	368645	50
11	9-595137	491	9-963434	90	9-631704	582	10-368296	49
12	595432	491	963379	90	632053	581	367947	48
13	595727	491	963325	90	632401	581	367599	47
14	596021	490	963271	90	632750	581	367250	46
15	596315	490	963217	90	633098	580	366902	45
16	596609	489	963163	90	633447	580	366553	44
17	596903	489	963108	91	633795	580	366205	43
18	597196	489	963054	91	634143	579	365857	42
19	597490	488	962999	91	634490	579	365510	41
20	597783	488	962945	91	634838	579	365162	40
21	9-598075	487	9-962890	91	9-635185	578	10-364815	39
22	598368	487	962836	91	635532	578	364468	38
23	598660	487	962781	91	635879	578	364121	37
24	598952	486	962727	91	636226	577	363774	36
25	599244	486	962672	91	636572	577	363428	35
26	599536	485	962617	91	636919	577	363081	34
27	599827	485	962562	91	637265	577	362735	33
28	600118	485	962508	91	637611	576	362389	32
29	600409	484	962453	91	637956	576	362044	31
30	600700	484	962398	92	638302	576	361698	30
31	9-600990	484	9-962343	92	9-638647	575	10-361353	29
32	601280	483	962288	92	638992	575	361008	28
33	601570	483	962233	92	639337	575	360663	27
34	601860	482	962178	92	639682	574	360318	26
35	602150	482	962123	92	640027	574	359973	25
36	602439	482	962067	92	640371	574	359629	24
37	602728	481	962012	92	640716	573	359284	23
38	603017	481	961957	92	641060	573	358940	22
39	603305	481	961902	92	641404	573	358596	21
40	603594	480	961846	92	641747	572	358253	20
41	9-603882	480	9-961791	92	9-642091	572	10-357909	19
42	604170	479	961735	92	642434	572	357566	18
43	604457	479	961680	92	642777	572	357223	17
44	604745	479	961624	93	643120	571	356880	16
45	605032	478	961569	93	643463	571	356537	15
46	605319	478	961513	93	643806	571	356194	14
47	605606	478	961458	93	644148	570	355852	13
48	605892	477	961402	93	644490	570	355510	12
49	606179	477	961346	93	644832	570	355168	11
50	606465	476	961290	93	645174	569	354826	10
51	9-606751	476	9-961235	93	9-645516	569	10-354484	9
52	607036	476	961179	93	645857	569	354143	8
53	607322	475	961123	93	646199	569	353801	7
54	607607	475	961067	93	646540	568	353460	6
55	607892	474	961011	93	646881	568	353119	5
56	608177	474	960955	93	647222	568	352778	4
57	608461	474	960899	93	647562	567	352438	3
58	608745	473	960843	94	647903	567	352097	2
59	609029	473	960786	94	648243	567	351757	1
60	609313	473	960730	94	648583	566	351417	0
	Cosine		Sine		Cotang.		Tang.	M.

M.	Sine	D.	Cosine	D.	Tang.	D.	Cotang.	M.
0	9.609313	473	9.960730	94	9.648583	566	10.351417	60
1	609597	472	960674	94	648923	566	351077	59
2	609880	472	960618	94	649263	566	350737	58
3	610164	472	960561	94	649602	566	350398	57
4	610447	471	960505	94	649942	565	350058	56
5	610729	471	960448	94	650281	565	349719	55
6	611012	470	960392	94	650620	565	349380	54
7	611294	470	960335	94	650959	564	349041	53
8	611576	470	960279	94	651297	564	348703	52
9	611858	469	960222	94	651636	564	348364	51
10	612140	469	960165	94	651974	563	348026	50
11	9.612421	469	9.960109	95	9.652312	563	10.347688	49
12	612702	468	960052	95	652650	563	347350	48
13	612983	468	959995	95	652988	563	347012	47
14	613264	467	959938	95	653326	562	346674	46
15	613545	467	959882	95	653663	562	346337	45
16	613825	467	959825	95	654000	562	346000	44
17	614105	466	959768	95	654337	561	345663	43
18	614385	466	959711	95	654674	561	345326	42
19	614665	466	959654	95	655011	561	344989	41
20	614944	465	959596	95	655348	561	344652	40
21	9.615223	465	9.959539	95	9.655684	560	10.344316	39
22	615502	465	959482	95	656020	560	343980	38
23	615781	464	959425	95	656356	560	343644	37
24	616060	464	959368	95	656692	559	343308	36
25	616338	464	959310	96	657028	559	342972	35
26	616616	463	959253	96	657364	559	342636	34
27	616894	463	959195	96	657699	559	342301	33
28	617172	462	959138	96	658034	558	341966	32
29	617450	462	959081	96	658369	558	341631	31
30	617727	462	959023	96	658704	558	341296	30
31	9.618004	461	9.958965	96	9.659039	558	10.340961	29
32	618281	461	958908	96	659373	557	340627	28
33	618558	461	958850	96	659708	557	340292	27
34	618834	460	958792	96	660042	557	339958	26
35	619110	460	958734	96	660376	557	339624	25
36	619386	460	958677	96	660710	556	339290	24
37	619662	459	958619	96	661043	556	338957	23
38	619938	459	958561	96	661377	556	338623	22
39	620213	459	958503	97	661710	555	338290	21
40	620488	458	958445	97	662043	555	337957	20
41	9.620763	458	9.958387	97	9.662376	555	10.337624	19
42	621038	457	958329	97	662709	554	337291	18
43	621313	457	958271	97	663042	554	336958	17
44	621587	457	958213	97	663375	554	336625	16
45	621861	456	958154	97	663707	554	336293	15
46	622135	456	958096	97	664039	553	335961	14
47	622409	456	958038	97	664371	553	335629	13
48	622682	455	957979	97	664703	553	335297	12
49	622956	455	957921	97	665035	553	334965	11
50	623229	455	957863	97	665366	552	334634	10
51	9.623502	454	9.957804	97	9.665697	552	10.334303	9
52	623774	454	957746	98	666029	552	333971	8
53	624047	454	957687	98	666360	551	333640	7
54	624319	453	957628	98	666691	551	333309	6
55	624591	453	957570	98	667021	551	332979	5
56	624863	453	957511	98	667352	551	332648	4
57	625135	452	957452	98	667682	550	332318	3
58	625406	452	957393	98	668013	550	331987	2
59	625677	452	957335	98	668343	550	331657	1
60	625948	451	957276	98	668672	550	331328	0
	Cosine		Sine		Cotang.		Tang.	M.

M.	Sine	D.	Cosine	D.	Tang.	D.	Cotang.	
0	9.625948	451	9.957276	98	9.638773	550	10.331327	60
1	626219	451	957217	98	669002	549	330998	59
2	626490	451	957158	98	669332	549	330668	58
3	626760	450	957099	98	669661	549	330339	57
4	627030	450	957040	98	669991	548	330009	56
5	627300	450	956981	98	670320	548	329680	55
6	627570	449	956921	99	670649	548	329351	54
7	627840	449	956862	99	670977	548	329023	53
8	628109	449	956803	99	671306	547	328694	52
9	628378	448	956744	99	671634	547	328366	51
10	628647	448	956684	99	671963	547	328037	50
11	9.628916	447	9.956625	99	9.672291	547	10.327709	49
12	629185	447	956566	99	672619	546	327381	48
13	629453	447	956506	99	672947	546	327053	47
14	629721	446	956447	99	673274	546	326726	46
15	629989	446	956387	99	673602	546	326398	45
16	630257	446	956327	99	673929	545	326071	44
17	630524	446	956268	99	674257	545	325743	43
18	630792	445	956208	100	674584	545	325416	42
19	631059	445	956148	100	674910	544	325090	41
20	631326	445	956089	100	675237	544	324763	40
21	9.631593	444	9.956029	100	9.675564	544	10.324436	39
22	631859	444	955969	100	675890	544	324110	38
23	632125	444	955909	100	676216	543	323784	37
24	632392	443	955849	100	676543	543	323457	36
25	632658	443	955789	100	676869	543	323131	35
26	632923	443	955729	100	677194	543	322806	34
27	633189	442	955669	100	677520	542	322480	33
28	633454	442	955609	100	677846	542	322154	32
29	633719	442	955548	100	678171	542	321829	31
30	633984	441	955488	100	678496	542	321504	30
31	9.634249	441	9.955428	101	9.678821	541	10.321179	29
32	634514	440	955368	101	679146	541	320854	28
33	634778	440	955307	101	679471	541	320529	27
34	635042	440	955247	101	679795	541	320205	26
35	635306	439	955186	101	680120	540	319880	25
36	635570	439	955126	101	680444	540	319556	24
37	635834	439	955065	101	680768	540	319232	23
38	636097	438	955005	101	681092	540	318908	22
39	636360	438	954944	101	681416	539	318584	21
40	636623	438	954883	101	681740	539	318260	20
41	9.636886	437	9.954823	101	9.682063	539	10.317937	19
42	637148	437	954762	101	682387	539	317613	18
43	637411	437	954701	101	682710	538	317290	17
44	637673	437	954640	101	683033	538	316967	16
45	637935	436	954579	101	683356	538	316644	15
46	638197	436	954518	102	683679	538	316321	14
47	638458	436	954457	102	684001	537	315999	13
48	638720	435	954396	102	684324	537	315676	12
49	638981	435	954335	102	684646	537	315354	11
50	639242	435	954274	102	684968	537	315032	10
51	9.639503	434	9.954213	102	9.685290	536	10.314710	9
52	639764	434	954152	102	685612	536	314388	8
53	640024	434	954090	102	685934	536	314066	7
54	640284	433	954029	102	686255	536	313745	6
55	640544	433	953968	102	686577	535	313423	5
56	640804	433	953906	102	686898	535	313102	4
57	641064	432	953845	102	687219	535	312781	3
58	641324	432	953783	102	687540	535	312460	2
59	641584	432	953722	103	687861	534	312139	1
60	641842	431	953660	103	688182	534	311818	0
	Cosine		Sine		Cotang.		Tang.	M.

M.	Sine	D.	Cosine	D.	Tang.	D.	Cotang.	
0	9-641842	431	9-953600	103	9-688182	534	10-311818	60
1	642101	431	953599	103	688502	534	311498	59
2	642360	421	953537	103	688823	534	311177	58
3	642618	430	953475	103	689143	533	310857	57
4	642877	430	953413	103	689463	533	310537	56
5	643135	430	953352	103	689783	533	310217	55
6	643393	430	953290	103	690103	533	309897	54
7	643650	429	953228	103	690423	533	309577	53
8	643908	429	953166	103	690742	532	309258	52
9	644165	429	953104	103	691062	532	308938	51
10	644423	428	953042	103	691381	532	308619	50
11	9-644680	428	9-952980	104	9-691700	531	10-30830	49
12	644936	428	952918	104	692019	531	307981	48
13	645193	427	952855	104	692338	531	307662	47
14	645450	427	952793	104	692656	531	307344	46
15	645706	427	952731	104	692975	531	307025	45
16	645962	426	952669	104	693293	530	306707	44
17	646218	426	952606	104	693612	530	306388	43
18	646474	426	952544	104	693930	530	306070	42
19	646729	425	952481	104	694248	530	305752	41
20	646984	425	952419	104	694566	529	305434	40
21	9-647240	425	9-952356	104	9-694883	529	10-305117	39
22	647494	424	952294	104	695201	529	304799	38
23	647749	424	952231	104	695518	529	304482	37
24	648004	424	952168	105	695836	529	304164	36
25	648258	424	952106	105	696153	528	303847	35
26	648512	423	952043	105	696470	528	303530	34
27	648766	423	951980	105	696787	528	303213	33
28	649020	423	951917	105	697103	528	302897	32
29	649274	422	951854	105	697420	527	302580	31
30	649527	422	951791	105	697736	527	302264	30
31	9-649781	422	9-951728	105	9-698053	527	10-301947	29
32	650034	422	951665	105	698369	527	301631	28
33	650287	421	951602	105	698685	526	301315	27
34	650539	421	951539	105	699001	526	300999	26
35	650792	421	951476	105	699316	526	300684	25
36	651044	420	951412	105	699632	526	300368	24
37	651297	420	951349	106	699947	526	300053	23
38	651549	420	951286	106	700263	525	299737	22
39	651800	419	951222	106	700578	525	299422	21
40	652052	419	951159	106	700893	525	299107	20
41	9-652304	419	9-951096	106	9-701208	524	10-298792	19
42	652555	418	951032	106	701523	524	298477	18
43	652806	418	950968	106	701837	524	298163	17
44	653057	418	950905	106	702152	524	297848	16
45	653308	418	950841	106	702466	524	297534	15
46	653558	417	950778	106	702780	523	297220	14
47	653808	417	950714	106	703095	523	296905	13
48	654059	417	950650	106	703409	523	296591	12
49	654309	416	950586	106	703723	523	296277	11
50	654558	416	950522	107	704036	522	295964	10
51	654808	416	9-950458	107	9-704350	522	10-295650	9
52	655058	416	950394	107	704663	522	295337	8
53	655307	415	950330	107	704977	522	295023	7
54	655556	415	950266	107	705290	522	294710	6
55	655805	415	950202	107	705603	521	294397	5
56	656054	414	950138	107	705916	521	294084	4
57	656302	414	950074	107	706228	521	293772	3
58	656551	414	950010	107	706541	521	293459	2
59	656799	413	949945	107	706854	521	293146	1
60	657047	413	949881	107	707166	520	292834	0
	Cosine		Sine		Cotang.		Tang.	M.

M.	Sine	D.	Cosine	D.	Tang.	D.	Cotang.	
0	9.657047	413	9.949881	167	9.707166	520	10.292834	60
1	657295	413	949816	167	707478	520	292522	59
2	657542	412	949752	167	707790	520	292210	58
3	657790	412	949688	168	708102	520	291898	57
4	658037	412	949623	168	708414	519	291586	56
5	658284	412	949558	168	708726	519	291274	55
6	658531	411	949494	168	709037	519	290963	54
7	658778	411	949429	168	709349	519	290651	53
8	659025	411	949364	168	709660	519	290340	52
9	659271	410	949300	168	709971	518	290029	51
10	659517	410	949235	168	710282	518	289718	50
11	9.659763	410	9.949170	168	9.710593	518	10.289407	49
12	660009	409	949105	168	710904	518	289096	48
13	660255	409	949040	168	711215	518	288785	47
14	660501	409	948975	168	711525	517	288475	46
15	660746	409	948910	168	711836	517	288164	45
16	660991	408	948845	168	712146	517	287854	44
17	661236	408	948780	169	712456	517	287544	43
18	661481	408	948715	169	712766	516	287234	42
19	661726	407	948650	169	713076	516	286924	41
20	661970	407	948584	169	713386	516	286614	40
21	9.662214	407	9.948519	169	9.713696	516	10.286304	39
22	662459	407	948454	169	714005	516	285995	38
23	662703	406	948388	169	714314	515	285686	37
24	662946	406	948323	169	714624	515	285376	36
25	663190	406	948257	169	714933	515	285067	35
26	663433	405	948192	169	715242	515	284758	34
27	663677	405	948126	169	715551	514	284449	33
28	663920	405	948060	169	715860	514	284140	32
29	664163	405	947995	110	716168	514	283832	31
30	664406	404	947929	110	716477	514	283523	30
31	9.664648	404	9.947863	110	9.716785	514	10.283215	29
32	664891	404	947797	110	717093	513	282907	28
33	665133	403	947731	110	717401	513	282599	27
34	665375	403	947665	110	717709	513	282291	26
35	665617	403	947600	110	718017	513	281983	25
36	665859	402	947533	110	718325	513	281675	24
37	666100	402	947467	110	718633	512	281367	23
38	666342	402	947401	110	718940	512	281060	22
39	666583	402	947335	110	719248	512	280752	21
40	666824	401	947269	110	719555	512	280445	20
41	9.667065	401	9.947203	110	8.719862	512	10.280138	19
42	667305	401	847136	111	720169	511	279831	18
43	667546	401	947070	111	720476	511	279524	17
44	667786	400	947004	111	720783	511	279217	16
45	668027	400	946937	111	721089	511	278911	15
46	668267	400	946871	111	721396	511	278604	14
47	668506	399	946804	111	721702	510	278298	13
48	668746	399	946738	111	722009	510	277991	12
49	668986	399	946671	111	722315	510	277685	11
50	669225	399	946604	111	722621	510	277379	10
51	9.669464	398	9.946528	111	9.722927	510	10.277073	9
52	669703	398	946471	111	723232	509	276768	8
53	669942	398	946404	111	723538	509	276462	7
54	670181	397	946337	111	723844	509	276156	6
55	670419	397	946270	112	724149	509	275851	5
56	670658	397	946203	112	724454	509	275546	4
57	670896	397	946136	112	724759	508	275241	3
58	671134	396	946069	112	725065	508	274935	2
59	671372	396	946002	112	725369	508	274631	1
60	671609	396	945935	112	725674	508	274326	0
	Cosine	—	Sine		Cotang.		Tang.	M.

M.	Sine	D.	Cosine	D.	Tang.	D.	Cotang.	
0	9.671609	396	9.945935	112	9.725674	508	10.274326	60
1	671847	395	945868	112	725979	508	274021	59
2	672084	395	945800	112	726284	507	273716	58
3	672321	395	945733	112	726588	507	273412	57
4	672558	395	945666	112	726892	507	273108	56
5	672795	394	945598	112	727197	507	272803	55
6	673032	394	945531	112	727501	507	272499	54
7	673268	394	945464	113	727805	506	272195	53
8	673505	394	945396	113	728109	506	271891	52
9	673741	393	945328	113	728412	506	271588	51
10	673977	393	945261	113	728716	506	271284	50
11	9.674213	393	9.945193	113	9.729020	506	10.270980	49
12	674448	392	945125	113	729323	505	270677	48
13	674684	392	945058	113	729626	505	270374	47
14	674919	392	944990	113	729929	505	270071	46
15	675155	392	944922	113	730233	505	269767	45
16	675390	391	944854	113	730535	505	269465	44
17	675624	391	944786	113	730838	504	269162	43
18	675859	391	944718	113	731141	504	268859	42
19	676094	391	944650	113	731444	504	268556	41
20	676328	390	944582	114	731746	504	268254	40
21	9.676562	390	9.944514	114	9.732048	504	10.267952	39
22	676796	390	944446	114	732351	503	267649	38
23	677030	390	944377	114	732653	503	267347	37
24	677264	389	944309	114	732955	503	267045	36
25	677498	389	944241	114	733257	503	266743	35
26	677731	389	944172	114	733558	503	266442	34
27	677964	388	944104	114	733860	502	266140	33
28	678197	388	944036	114	734162	502	265838	32
29	678430	388	943967	114	734463	502	265537	31
30	678663	388	943899	114	734764	502	265236	30
31	9.678895	387	9.943830	114	9.735066	402	10.264934	29
32	679128	387	943761	114	735367	502	264633	28
33	679360	387	943693	115	735668	501	264332	27
34	679592	387	943624	115	735969	501	264031	26
35	679824	386	943555	115	736269	501	263731	25
36	680056	386	943486	115	736570	501	263430	24
37	680288	386	943417	115	736871	501	263129	23
38	680519	385	943348	115	737171	500	262829	22
39	680750	385	943279	115	737471	500	262529	21
40	680982	385	943210	115	737771	500	262229	20
41	9.681213	385	9.943141	115	9.738071	500	10.261929	19
42	681443	384	943072	115	438371	500	261629	18
43	681674	384	943003	115	738671	499	261329	17
44	681905	384	942934	115	738971	499	261029	16
45	682135	384	942864	115	739271	499	260729	15
46	682365	383	942795	116	739570	499	260430	14
47	682595	383	942726	116	739870	499	260130	13
48	682825	383	942656	116	740169	499	259831	12
49	683055	383	942587	116	740468	498	259532	11
50	683284	382	942517	116	740767	498	259233	10
51	9.683514	382	9.942448	116	9.741066	498	10.258934	9
52	683743	382	942378	116	741365	498	258635	8
53	683972	382	942308	116	741664	498	258336	7
54	684201	381	942239	116	741962	497	258038	6
55	684430	381	942169	116	742261	497	257739	5
56	684658	381	942099	116	742559	497	257441	4
57	684887	380	942029	116	742858	497	257142	3
58	685115	380	941959	116	743156	497	256844	2
59	685343	380	941889	117	743454	497	256546	1
60	685571	380	941819	117	743752	496	256248	0
	Cosine		Sine		Cotang.		Tang.	M

M.	Sine	D.	Cosine	D.	Tang.	D.	Cotang.	M.
0	9-685571	380	9-941819	117	9-743752	496	10-256248	60
1	685799	379	941749	117	744050	496	255950	59
2	686027	379	941679	117	744348	496	255652	58
3	686254	379	941609	117	744645	496	255355	57
4	686482	379	941539	117	744943	496	255057	56
5	686709	378	941469	117	745240	496	254760	55
6	686936	378	941398	117	745538	495	254462	54
7	687163	378	941328	117	745835	495	254165	53
8	687389	378	941258	117	746132	495	253868	52
9	687616	377	941187	117	746429	495	253571	51
10	687843	377	941117	117	746726	495	253274	50
11	9-688069	377	9-941046	118	9-747023	494	10-252977	49
12	688295	377	940975	118	747319	494	252681	48
13	688521	376	940905	118	747616	494	252384	47
14	688747	376	940834	118	747913	494	252087	46
15	688972	376	940763	118	748209	494	251791	45
16	689198	376	940693	118	748505	493	251495	44
17	689423	375	940622	118	748801	493	251199	43
18	689648	375	940551	118	749097	493	250903	42
19	689873	375	940480	118	749393	493	250607	41
20	680098	375	940409	118	749689	493	250311	40
21	9-690323	374	9-940338	118	9-749985	493	10-250015	39
22	690548	374	940267	118	750281	492	249719	38
23	690772	374	940196	118	750576	492	249424	37
24	690996	374	940125	119	750872	492	249128	36
25	691220	373	940054	119	751167	492	248833	35
26	691444	373	939982	119	751462	492	248538	34
27	691668	373	939911	119	751757	492	248243	33
28	691892	373	939840	119	752052	491	247948	32
29	692115	372	939768	119	752347	491	247653	31
30	692339	372	939697	119	752642	491	247358	30
31	9-692562	372	9-939625	119	9-752937	491	10-247063	29
32	692785	371	939554	119	753231	491	246769	28
33	693008	371	939482	119	753526	491	246474	27
34	693231	371	939410	119	753820	490	246180	26
35	693453	371	939339	119	754115	490	245885	25
36	693676	370	939267	120	754409	490	245591	24
37	693898	370	939195	120	754703	490	245297	23
38	694120	370	939123	120	754997	490	245003	22
39	694342	370	939052	120	755291	490	244709	21
40	694564	369	938980	120	755585	489	244415	20
41	9-694786	369	9-938908	120	9-755878	489	10-244122	19
42	695007	369	938836	120	756172	489	243828	18
43	695229	369	938763	120	756465	489	243535	17
44	695450	368	938691	120	756759	489	243241	16
45	695671	368	938619	120	757052	489	242948	15
46	695892	368	938547	120	757345	488	242655	14
47	696113	368	938475	120	757638	488	242362	13
48	696334	367	938402	121	757931	488	242069	12
49	696554	367	938330	121	758224	488	241776	11
50	696775	367	938258	121	758517	488	241483	10
51	9-696995	367	9-938185	121	9-758810	488	10-241190	9
52	697215	366	938113	121	759102	487	240898	8
53	697435	366	938040	121	759395	487	240605	7
54	697654	366	937967	121	759687	487	240313	6
55	697874	366	937895	121	759979	487	240021	5
56	698094	365	937822	121	760272	487	239728	4
57	698313	365	937749	121	760564	487	239436	3
58	698532	365	937676	121	760856	486	239144	2
59	698751	365	937604	121	761148	486	238852	1
60	698970	364	937531	121	761439	486	238561	0
	Cosine		Sine		Cotang.		Tang.	M.

M.	Sine	D.	Cosine	D.	Tang.	D.	Cotang.	
0	9.698970	364	9.957531	121	9.761439	486	10.238561	60
1	699189	364	937458	122	761731	486	238269	59
2	699407	364	937385	122	762023	486	237977	58
3	699626	364	937312	122	762314	486	237686	57
4	699844	363	937238	122	762606	485	237394	56
5	700062	363	937165	122	762897	485	237103	55
6	700280	363	937092	122	763188	485	236812	54
7	700498	363	937019	122	763479	485	236521	53
8	700716	363	936946	122	763770	485	236230	52
9	700933	362	936872	122	764061	485	235939	51
10	701151	362	936799	122	764352	484	235648	50
11	9.701368	362	9.936725	122	9.764643	484	10.235357	49
12	701585	362	936652	123	764933	484	235067	48
13	701802	361	936578	123	765224	484	234776	47
14	702019	361	936505	123	765514	484	234486	46
15	702236	361	936431	123	765805	484	234195	45
16	702452	361	936357	123	766095	484	233905	44
17	702669	360	936284	123	766385	483	233615	43
18	702885	360	936210	123	766675	483	233325	42
19	703101	360	936136	123	766965	483	233035	41
20	703317	360	936062	123	767255	483	232745	40
21	9.703533	359	9.935988	123	9.767545	483	10.232455	39
22	703749	359	935914	123	767834	483	232166	38
23	703964	359	935840	123	768124	482	231876	37
24	704179	359	935766	124	768413	482	231587	36
25	704395	359	935692	124	768703	482	231297	35
26	704610	358	935618	124	768992	482	231008	34
27	704825	358	935543	124	769281	482	230719	33
28	705040	358	935469	124	769570	482	230430	32
29	705254	358	935395	124	769860	481	230140	31
30	705469	357	935320	124	770148	481	229852	30
31	9.705683	357	9.935246	124	9.770437	481	10.229563	29
32	705898	357	935171	124	770726	481	229274	28
33	706112	357	935097	124	771015	481	228985	27
34	706326	356	935022	124	771303	481	228697	26
35	706539	356	934948	124	771592	481	228408	25
36	706753	356	934873	124	771880	480	228120	24
37	706967	356	934798	125	772168	480	227832	23
38	707180	355	934723	125	772457	480	227543	22
39	707393	355	934649	125	772745	480	227255	21
40	707606	355	934574	125	773033	480	226967	20
41	9.707819	355	9.934499	125	9.773321	480	10.226679	19
42	708032	354	934424	125	773608	479	226392	18
43	708245	354	934349	125	773896	479	226104	17
44	708458	354	934274	125	774184	479	225816	16
45	708670	354	934199	125	774471	479	225529	15
46	708882	353	934123	125	774759	479	225241	14
47	709094	353	934048	125	775046	479	224954	13
48	709306	353	933973	125	775333	479	224667	12
49	709518	353	933898	126	775621	478	224379	11
50	709730	353	933822	126	775908	478	224092	10
51	9.709941	352	9.933747	126	9.776195	478	10.223805	9
52	710153	352	933671	126	776482	478	223518	8
53	710364	352	933596	126	776769	478	223231	7
54	710575	352	933520	126	777055	478	222945	6
55	710786	351	933445	126	777342	478	222658	5
56	710997	351	933369	126	777628	477	222372	4
57	711208	351	933293	126	777915	477	222085	3
58	711419	351	933217	126	778201	477	221799	2
59	711629	350	933141	126	778487	477	221512	1
60	711839	350	933066	126	778774	477	221226	0
	Cosine		Sine		Cotang.		Tang.	M.

M.	Sine	D.	Cosine	D.	Tang.	D.	Cotang.	
0	9-711839	350	9-933066	126	9-778774	477	10-221226	60
1	712050	350	932990	127	779060	477	220940	59
2	712260	350	932914	127	779346	476	220654	58
3	712469	349	932838	127	779632	476	220368	57
4	712679	349	932762	127	779918	476	220082	56
5	712889	349	932685	127	780203	476	219797	55
6	713098	349	932609	127	780489	476	219511	54
7	713308	349	932533	127	780775	476	219225	53
8	713517	348	932457	127	781060	476	218940	52
9	713726	348	932380	127	781346	475	218654	51
10	713935	348	932304	127	781631	475	218369	50
11	9-714144	348	9-932228	127	9-781916	475	10-218084	49
12	714352	347	932151	127	782201	475	217799	48
13	714561	347	932075	128	782486	475	217514	47
14	714769	347	931998	128	782771	475	217229	46
15	714978	347	931921	128	783056	475	216944	45
16	715186	347	931845	128	783341	475	216659	44
17	715394	346	931768	128	783626	474	216374	43
18	715602	346	931691	128	783910	474	216090	42
19	715809	346	931614	128	784195	474	215805	41
20	716017	346	931537	128	784479	474	215521	40
21	9-716224	345	9-931460	128	9-784764	474	10-215236	39
22	716432	345	931383	128	785048	474	214952	38
23	716639	345	931306	128	785332	473	214668	37
24	716846	345	931229	129	785616	473	214384	36
25	717053	345	931152	129	785900	473	214100	35
26	717259	344	931075	129	786184	473	213816	34
27	717466	344	930998	129	786468	473	213532	33
28	717673	344	930921	129	786752	473	213248	32
29	717879	344	930843	129	787036	473	212964	31
30	718085	343	930766	129	787319	472	212681	30
31	9-718291	343	9-930688	129	9-787603	472	10-212337	29
32	718497	343	930611	129	787886	472	212114	28
33	718703	343	930533	129	788170	472	211830	27
34	718909	343	930456	129	788453	472	211547	26
35	719114	342	930378	129	788736	472	211264	25
36	719320	342	930300	130	789019	472	210981	24
37	719525	342	930223	130	789302	471	210698	23
38	719730	342	930145	130	789585	471	210415	22
39	719935	341	930067	130	789868	471	210132	21
40	720140	341	929989	130	790151	471	209849	20
41	9-720345	341	9-929911	130	9-790433	471	10-209567	19
42	720549	341	929833	130	790716	471	209284	18
43	720754	340	929755	130	790999	471	209001	17
44	720958	340	929677	130	791281	471	208719	16
45	721162	340	929599	130	791563	470	208437	15
46	721366	340	929521	130	791846	470	208154	14
47	721570	340	929442	130	792128	470	207872	13
48	721774	339	929364	131	792410	470	207590	12
49	721978	339	929286	131	792692	470	207308	11
50	722181	339	929207	131	792974	470	207026	10
51	9-722385	339	9-929129	131	9-793256	470	10-206744	9
52	722588	339	929050	131	793538	469	206462	8
53	722791	338	928972	131	793819	469	206181	7
54	722994	338	928893	131	794101	469	205899	6
55	723197	338	928815	131	794383	469	205617	5
56	723400	338	928736	131	794664	469	205336	4
57	723603	337	928657	131	794945	469	205055	3
58	723805	337	928578	131	795227	469	204773	2
59	724007	337	928499	131	795508	468	204492	1
60	724210	337	928420	131	795789	468	204211	0
	Cosine		Sine		Cotang.		Tang.	M.

M.	Sine	D.	Cosine	D.	Tang.	D.	Cotang.	
0	9.724210	337	9.928420	132	9.795789	468	10.204211	60
1	724412	337	928342	132	796070	468	203630	59
2	724614	336	928263	132	796351	468	203649	58
3	724816	336	928183	132	796632	468	203368	57
4	725017	336	928104	132	796913	468	203687	56
5	725219	336	928025	132	797194	468	202806	55
6	725420	335	927946	132	797475	468	202525	54
7	725622	335	927867	132	797755	468	202245	53
8	725823	335	927787	132	798036	467	201964	52
9	726024	335	927708	132	798316	467	201684	51
10	726225	335	927629	132	798596	467	201404	50
11	9.726426	334	9.927549	132	9.798877	467	10.201123	49
12	726626	334	927470	133	799157	467	200843	48
13	726827	334	927390	133	799437	467	200563	47
14	727027	334	927310	133	799717	467	200283	46
15	727228	334	927231	133	799997	466	200003	45
16	727428	333	927151	133	800277	466	199723	44
17	727628	333	927071	133	800557	466	199443	43
18	727828	333	926991	133	800836	466	199164	42
19	728027	333	926911	133	801116	466	198884	41
20	728227	333	926831	133	801396	466	198604	40
21	9.728427	332	9.926751	133	9.801675	466	10.198325	39
22	728626	332	926671	133	801955	466	198045	38
23	728825	332	926591	133	802234	465	197766	37
24	729024	332	926511	134	802513	465	197487	36
25	729223	331	926431	134	802792	465	197208	35
26	729422	331	926351	134	803072	465	196928	34
27	729621	331	926270	134	803351	465	196649	33
28	729820	331	926190	134	803630	465	196370	32
29	730018	330	926110	134	803908	465	196092	31
30	730216	330	926029	134	804187	465	195813	30
31	9.730415	330	9.925949	134	9.804466	464	10.195534	29
32	730613	330	925868	134	804745	464	195255	28
33	730811	330	925788	134	805023	464	194977	27
34	731009	329	925707	134	805302	464	194698	26
35	731206	329	925626	134	805580	464	194420	25
36	731404	329	925545	135	805859	464	194141	24
37	731602	329	925465	135	806137	464	193863	23
38	731799	329	925384	135	806415	463	193585	22
39	731996	328	925303	135	806693	463	193307	21
40	732193	328	925222	135	806971	463	193029	20
41	9.732390	328	9.925141	135	9.807249	463	10.192751	19
42	732587	328	925060	135	807527	463	192473	18
43	732784	328	924979	135	807805	463	192195	17
44	732980	327	924897	135	808083	463	191917	16
45	733177	327	924816	135	808361	463	191639	15
46	733373	327	924735	136	808638	462	191362	14
47	733569	327	924654	136	808916	462	191084	13
48	733765	327	924572	136	809193	462	190807	12
49	733961	326	924491	136	809471	462	190529	11
50	734157	326	924409	136	809748	462	190252	10
51	9.734353	326	9.924328	136	9.810025	462	10.189975	9
52	734549	326	924246	136	810302	462	189698	8
53	734744	325	924164	136	810580	462	189420	7
54	734939	325	924083	136	810857	462	189143	6
55	735135	325	924001	136	811134	461	188866	5
56	735330	325	923919	136	811410	461	188590	4
57	735525	325	923837	136	811687	461	188313	3
58	735719	324	923755	137	811964	461	188036	2
59	735914	324	923673	137	812241	461	187759	1
60	736109	324	923591	137	812517	461	187483	0
	Cosine		Sine		Cotang.		Tang.	M.

M.	Sine	D.	Cosine	D.	Tang.	D.	Cotang.	
0	9736169	324	9923591	137	9812517	461	10187482	60
1	736363	324	923569	137	812794	461	187266	59
2	736498	324	923427	137	813670	461	186930	58
3	736692	323	923245	137	813247	460	186653	57
4	736886	323	923263	137	813623	460	186377	56
5	737080	323	923181	137	813899	460	186101	55
6	737274	323	923098	137	814175	460	185825	54
7	737467	323	923016	137	814452	460	185548	53
8	737661	322	922933	137	814728	460	185272	52
9	737855	322	922851	137	815004	460	184996	51
10	738048	322	922768	138	815279	460	184721	50
11	9738241	322	9922686	138	9815555	459	10184445	49
12	738434	322	922603	138	815831	459	184169	48
13	738627	321	922520	138	816107	459	183893	47
14	738820	321	922438	138	816382	459	183618	46
15	739013	321	922355	138	816658	459	183342	45
16	739206	321	922272	138	816933	459	183067	44
17	739398	321	922189	138	817209	459	182791	43
18	739590	320	922106	138	817484	459	182516	42
19	739783	320	922023	138	817759	459	182241	41
20	739975	320	921940	138	818035	458	181965	40
21	9740167	320	9921857	139	9818310	458	10181690	39
22	740359	320	921774	139	818585	458	181415	38
23	740550	319	921691	139	818860	458	181140	37
24	740742	319	921607	139	819135	458	180865	36
25	740934	319	921524	139	819410	458	180590	35
26	741125	319	921441	139	819684	458	180316	34
27	741316	319	921357	139	819959	458	180041	33
28	741508	318	921274	139	820234	458	179766	32
29	741699	318	921190	139	820508	457	179492	31
30	741889	318	921107	139	820783	457	179217	30
31	9742080	318	9921023	139	9821657	457	10178943	29
32	742271	318	920939	140	821332	457	178668	28
33	742402	317	920856	140	821606	457	178394	27
34	742652	317	920772	140	821880	457	178120	26
35	742842	317	920688	140	822154	457	177846	25
36	743033	317	920604	140	822429	457	177571	24
37	743223	317	920520	140	822703	457	177297	23
38	743413	316	920436	140	822977	456	177023	22
39	743602	316	920352	140	823250	456	176750	21
40	743792	316	920268	140	823524	456	176476	20
41	9743982	316	9920184	140	9823798	456	10176202	19
42	744171	316	920099	140	824072	456	175928	18
43	744361	315	920015	140	824345	456	175655	17
44	744550	315	919931	141	824619	456	175381	16
45	744739	315	919846	141	824893	456	175107	15
46	744928	315	919762	141	825166	456	174834	14
47	745117	315	919677	141	825439	455	174561	13
48	745306	314	919593	141	825713	455	174287	12
49	745494	314	919508	141	825986	455	174014	11
50	745683	314	919424	141	826259	455	173741	10
51	9745871	314	9919339	141	9826532	455	10173408	9
52	746059	314	919254	141	826865	455	173195	8
53	746248	313	919169	141	827078	455	172922	7
54	746436	313	919085	141	827351	455	172649	6
55	746624	313	919000	141	827624	455	172376	5
56	746812	313	918915	142	827897	454	172103	4
57	746999	313	918830	142	828170	454	171830	3
58	747187	312	918745	142	828442	454	171558	2
59	747374	312	918659	142	828715	454	171285	1
60	747562	312	918574	142	828987	454	171013	0
	Cosine		Sine		Cotang.		Tang.	M.

M.	Sine	D.	Cosine	D.	Tang.	D.	Cotang.	
0	9-747562	312	9-918574	142	9-828987	454	10-171013	60
1	747749	312	918489	142	829260	454	170740	59
2	747936	312	918404	142	829532	454	170468	58
3	748123	311	918318	142	829805	454	170195	57
4	748310	311	918233	142	830077	454	169923	56
5	748497	311	918147	142	830349	453	169651	55
6	748683	311	918062	142	830621	453	169379	54
7	748870	311	917976	143	830893	453	169107	53
8	749056	310	917891	143	831165	453	168835	52
9	749243	310	917805	143	831437	453	168563	51
10	749429	310	917719	143	831709	453	168291	50
11	9-749615	310	9-917634	143	9-831981	453	10-168019	49
12	749801	310	917548	143	832253	453	167747	48
13	749987	309	917462	143	832525	453	167475	47
14	750172	309	917376	143	832796	453	167204	46
15	750358	309	917290	143	833068	452	166932	45
16	750543	309	917204	143	833339	452	166661	44
17	750729	309	917118	144	833611	452	166389	43
18	750914	308	917032	144	833882	452	166118	42
19	751099	308	916946	144	834154	452	165846	41
20	751284	308	916859	144	834425	452	165575	40
21	9-751469	308	9-916773	144	9-834696	452	10-165304	39
22	751654	308	916687	144	834967	452	165033	38
23	751839	308	916600	144	835238	452	164762	37
24	752023	307	916514	144	835509	452	164491	36
25	752208	307	916427	144	835780	451	164220	35
26	752392	307	916341	144	836051	451	163949	34
27	752576	307	91 254	144	836322	451	163678	33
28	752760	307	916167	145	836593	451	163407	32
29	752944	306	916081	145	836864	451	163136	31
30	753128	306	915994	145	837134	451	162866	30
31	9-753312	306	9-915907	145	9-837405	451	10-162595	29
32	753495	306	915820	145	837675	451	162325	28
33	753679	306	915733	145	837946	451	162054	27
34	753862	305	915646	145	838216	451	161784	26
35	754046	305	915559	145	838487	450	161513	25
36	754229	305	915472	145	838757	450	161243	24
37	754412	305	915385	145	839027	450	160973	23
38	754595	305	915297	145	839297	450	160703	22
39	754778	304	915210	145	839568	450	160432	21
40	754960	304	915123	146	839838	450	160162	20
41	9-755143	304	9-915035	146	9-840108	450	10-159892	19
42	755326	304	914948	146	840378	450	159622	18
43	755508	304	914860	146	840647	450	159353	17
44	755690	304	914773	146	840917	449	159083	16
45	755872	303	914685	146	841187	449	158813	15
46	756054	303	914598	146	841457	449	158543	14
47	756236	303	914510	146	841726	449	158274	13
48	756418	303	914422	146	841996	449	158004	12
49	756600	303	914334	146	842266	449	157734	11
50	756782	302	914246	147	842535	449	157465	10
51	9-756963	302	9-914158	147	9-842805	449	10-157195	9
52	757144	302	914070	147	843074	449	156926	8
53	757326	302	913982	147	843343	449	156657	7
54	757507	302	913894	147	843612	449	156388	6
55	757688	301	913806	147	843882	448	156118	5
56	757869	301	913718	147	844151	448	155849	4
57	758050	301	913630	147	844420	448	155580	3
58	758230	301	913541	147	844689	448	155311	2
59	758411	301	913453	147	844958	448	155042	1
60	758591	301	913365	147	845227	448	154773	0
	Cosine		Sine		Cotang.		Tang.	M.

M.	Sine	D.	Cosine	D.	Tang.	D.	Cotang.	
0	9.758591	301	9.913365	147	9.845227	448	10.154773	60
1	758772	300	913276	147	845496	448	154504	59
2	758952	300	913187	148	845764	448	154236	58
3	759132	300	913099	148	846033	448	153967	57
4	759312	300	913010	148	846302	448	153698	56
5	759492	300	912922	148	846570	447	153430	55
6	759672	299	912833	148	846839	447	153161	54
7	759852	299	912744	148	847107	447	152893	53
8	760031	299	912655	148	847376	447	152624	52
9	760211	299	912566	148	847644	447	152356	51
10	760390	299	912477	148	847913	447	152087	50
11	9.760569	298	9.912388	148	9.848181	447	10.151819	49
12	760748	298	912299	149	848449	447	151551	48
13	760927	298	912210	149	848717	447	151283	47
14	761106	298	912121	149	848986	447	151014	46
15	761285	298	912031	149	849254	447	150746	45
16	761464	298	911942	149	849522	447	150478	44
17	761642	297	911853	149	849790	446	150210	43
18	761821	297	911763	149	850058	446	149942	42
19	761999	297	911674	149	850325	446	149675	41
20	762177	297	911584	149	850593	446	149407	40
21	9.762356	297	9.911495	149	9.850861	446	10.149139	39
22	762534	296	911405	149	851129	446	148871	38
23	762712	296	911315	150	851396	446	148604	37
24	762889	296	911226	150	851664	446	148336	36
25	763067	296	911136	150	851931	446	148069	35
26	763245	296	911046	150	852199	446	147801	34
27	763422	296	910956	150	852466	446	147534	33
28	763600	295	910866	150	852733	445	147267	32
29	763777	295	910776	150	853001	445	146999	31
30	763954	295	910686	150	853268	445	146732	30
31	9.764131	295	9.910596	150	9.853535	445	10.146465	29
32	764308	295	910506	150	853802	445	146198	28
33	764485	294	910415	150	854069	445	145931	27
34	764662	294	910325	151	854336	445	145664	26
35	764838	294	910235	151	854603	445	145397	25
36	765015	294	910144	151	854870	445	145130	24
37	765191	294	910054	151	855137	445	144863	23
38	765367	294	909963	151	855404	445	144596	22
39	765544	293	909873	151	855671	444	144329	21
40	765720	293	909782	151	855938	444	144062	20
41	9.765896	293	9.909691	151	9.856204	444	10.148796	19
42	766072	293	909601	151	856471	444	143529	18
43	766247	293	909510	151	856737	444	143263	17
44	766423	293	909419	151	857004	444	142996	16
45	766598	292	909328	152	857270	444	142730	15
46	766774	292	909237	152	857537	444	142463	14
47	766949	292	909146	152	857803	444	142197	13
48	767124	292	909055	152	858069	444	141931	12
49	767300	292	908964	152	858336	444	141664	11
50	767475	291	908873	152	858602	443	141398	10
51	9.767649	291	9.908781	152	9.858868	443	10.141132	9
52	767824	291	908690	152	859134	443	140866	8
53	767999	291	908599	152	859400	443	140600	7
54	768173	291	908507	152	859666	443	140334	6
55	768348	290	908416	153	859932	443	140068	5
56	768522	290	908324	153	860198	443	139802	4
57	768697	290	908233	153	860464	443	139536	3
58	768871	290	908141	153	860730	443	139270	2
59	769045	290	908049	153	860995	443	139005	1
60	769219	290	907958	153	861261	443	138739	0
	Cosine		Sine		Cotang.		Tang.	M.

M.	Sine	D.	Cosine	D.	Tang.	D.	Cotang.	
0	9.769219	290	9.907958	153	9.861261	443	10.138739	60
1	769393	289	907866	153	861527	443	138473	59
2	769566	289	907774	153	861792	442	138268	58
3	769740	289	907682	153	862058	442	137942	57
4	769913	289	907590	153	862323	442	137677	56
5	770087	289	907498	153	862589	442	137411	55
6	770260	288	907406	153	862854	442	137146	54
7	770433	288	907314	154	863119	442	136881	53
8	770606	288	907222	154	863385	442	136615	52
9	770779	288	907129	154	863650	442	136350	51
10	770952	288	907037	154	863915	442	136085	50
11	9.771125	288	9.906945	154	9.864180	442	10.135820	49
12	771298	287	906852	154	864445	442	135555	48
13	771470	287	906760	154	864710	442	135290	47
14	771643	287	906667	154	864975	441	135025	46
15	771815	287	906575	154	865240	441	134760	45
16	771987	287	906482	154	865505	441	134495	44
17	772159	287	906389	155	865770	441	134230	43
18	772331	286	906296	155	866035	441	133965	42
19	772503	286	906204	155	866300	441	133700	41
20	772675	286	906111	155	866564	441	133436	40
21	9.772847	286	9.906018	155	9.866829	441	10.133171	39
22	773018	286	905925	155	867094	441	132936	38
23	773190	286	905832	155	867358	441	132642	37
24	773361	285	905739	155	867623	441	132377	36
25	773533	285	905645	155	867887	441	132113	35
26	773704	285	905552	155	868152	440	131848	34
27	773875	285	905459	155	868416	440	131584	33
28	774046	285	905366	156	868680	440	131320	32
29	774217	285	905272	156	868945	440	131055	31
30	774388	284	905179	156	869209	440	130791	30
31	9.774558	284	9.905085	156	9.869473	440	10.130527	29
32	774729	284	904992	156	869737	440	130263	28
33	774899	284	904898	156	870001	440	129999	27
34	775070	284	904804	156	870265	440	129735	26
35	775240	284	904711	156	870529	440	129471	25
36	775410	283	904617	156	870793	440	129207	24
37	775580	283	904523	156	871057	440	128943	23
38	775750	283	904429	157	871321	440	128679	22
39	775920	283	904335	157	871585	440	128415	21
40	776090	283	904241	157	871849	439	128151	20
41	9.776259	283	9.904147	157	9.872112	439	10.127888	19
42	776429	282	904053	157	872376	439	127624	18
43	776598	282	903959	157	872640	439	127360	17
44	776768	282	903864	157	872903	439	127097	16
45	776937	282	903770	157	873167	439	126833	15
46	777106	282	903676	157	873430	439	126570	14
47	777275	281	903581	157	873694	439	126306	13
48	777444	281	903487	157	873957	439	126043	12
49	777613	281	903392	158	874220	439	125780	11
50	777781	281	903298	158	874484	439	125516	10
51	9.777950	281	9.903203	158	9.874747	439	10.125253	9
52	778119	281	903108	158	875010	439	124990	8
53	778287	280	903014	158	875273	438	124727	7
54	778455	280	902919	158	875536	438	124464	6
55	778624	280	902824	158	875800	438	124200	5
56	778792	280	902729	158	876063	438	123937	4
57	778960	280	902634	158	876326	438	123674	3
58	779128	280	902539	159	876589	438	123411	2
59	779295	279	902444	159	876851	438	123149	1
60	779463	279	902349	159	877114	438	122886	0
	Cosine		Sine		Cotang.		Tang.	M.

M.	Sine	D.	Cosine	D.	Tang.	D.	Cotang.	
0	9779463	279	9902349	159	9877114	438	10122886	60
1	779631	279	992253	159	877377	438	122623	59
2	779798	279	992158	159	877640	438	122360	58
3	779966	279	992063	159	877903	438	122097	57
4	780133	279	991967	159	878165	438	121835	56
5	780300	278	991872	159	878428	438	121572	55
6	780467	278	991776	159	878691	438	121309	54
7	780634	278	991681	159	878953	437	121047	53
8	780801	278	991585	159	879216	437	120784	52
9	780968	278	991490	159	879478	437	120522	51
10	781134	278	991394	160	879741	437	120259	50
11	9781301	277	9901298	160	9880003	437	10119997	49
12	781468	277	991262	160	880265	437	119735	48
13	781634	277	991166	160	880528	437	119472	47
14	781800	277	991010	160	880790	437	119210	46
15	781966	277	990914	160	881052	437	118948	45
16	782132	277	990818	160	881314	437	118686	44
17	782298	276	990722	160	881576	437	118424	43
18	782464	276	990626	160	881839	437	118161	42
19	782630	276	990529	160	882101	437	117899	41
20	782796	276	990433	161	882363	436	117637	40
21	9782961	276	9900337	161	9882625	436	10117375	39
22	783127	276	990240	161	882887	436	117113	38
23	783292	275	990144	161	883148	436	116852	37
24	783458	275	990047	161	883410	436	116590	36
25	783623	275	899951	161	883672	436	116328	35
26	783788	275	899854	161	883934	436	116066	34
27	783953	275	899757	161	884196	436	115804	33
28	784118	275	899660	161	884457	436	115543	32
29	784282	274	899564	161	884719	436	115281	31
30	784447	274	899467	162	884980	436	115020	30
31	9784612	274	9899370	162	9885242	436	10114758	29
32	784776	274	899273	162	885503	436	114497	28
33	784941	274	899176	162	885765	436	114235	27
34	785105	274	899078	162	886026	436	113974	26
35	785269	273	898981	162	886288	436	113712	25
36	785433	273	898884	162	886549	435	113451	24
37	785597	273	898787	162	886810	435	113190	23
38	785761	273	898689	162	887072	435	112928	22
39	785925	273	898592	162	887333	435	112667	21
40	786089	273	898494	163	887594	435	112406	20
41	9786252	272	9898397	163	9887855	435	10112145	19
42	786416	272	898299	163	888116	435	111884	18
43	786579	272	898202	163	888377	435	111623	17
44	786742	272	898104	163	888639	435	111361	16
45	786906	272	898006	163	888900	435	111100	15
46	787069	272	897908	163	889160	435	110840	14
47	787232	271	897810	163	889421	435	110579	13
48	787395	271	897712	163	889682	435	110318	12
49	787557	271	897614	163	889943	435	110057	11
50	787720	271	897516	163	890204	434	119796	10
51	9787883	271	9897418	164	9890465	434	10109535	9
52	788045	271	897320	164	890725	434	109275	8
53	788208	271	897222	164	890986	434	109014	7
54	788370	270	897123	164	891247	434	108753	6
55	788532	270	897025	164	891507	434	108493	5
56	788694	270	896926	164	891768	434	108232	4
57	788856	270	896828	164	892028	434	107972	3
58	789018	270	896729	164	892289	434	107711	2
59	789180	270	896631	164	892549	434	107451	1
60	789342	269	896532	164	892810	434	107190	0
	Cosine		Sine		Cotang.		Tang.	M.

M.	Sine	D.	Cosine	D.	Tang.	D.	Cotang	
0	9.789342	269	9.896532	164	9.892810	434	10.107190	60
1	789504	269	896433	165	893070	434	106930	59
2	789665	269	896335	165	893331	434	106669	58
3	789827	269	896236	165	893591	434	106409	57
4	789988	269	896137	165	893851	434	106149	56
5	790149	269	896038	165	894111	434	105889	55
6	790310	268	895939	165	894371	434	105629	54
7	790471	268	895840	165	894632	433	105368	53
8	790632	268	895741	165	894892	433	105108	52
9	790793	268	895641	165	895152	433	104848	51
10	790954	268	895542	165	895412	433	104588	50
11	9.791115	268	9.895443	166	9.895672	433	10.104328	49
12	791275	267	895343	166	895932	433	104068	48
13	791436	267	895244	166	896192	433	103808	47
14	791596	267	895145	166	896452	433	103548	46
15	791757	267	895045	166	896712	433	103288	45
16	791917	267	894945	166	896971	433	103029	44
17	792077	267	894846	166	897231	433	102769	43
18	792237	266	894746	166	897491	433	102509	42
19	792397	266	894646	166	897751	433	102249	41
20	792557	266	894546	166	898010	433	101990	40
21	9.792716	266	9.894446	167	9.898270	433	10.101730	39
22	792876	266	894346	167	898530	433	101470	38
23	793035	266	894246	167	898789	433	101211	37
24	793195	265	894146	167	899049	432	100951	36
25	793354	265	894046	167	899308	432	100692	35
26	793514	265	893946	167	899568	432	100432	34
27	793673	265	893846	167	899827	432	100173	33
28	793832	265	893745	167	900086	432	099914	32
29	793991	265	893645	167	900346	432	099654	31
30	794150	264	893544	167	900605	432	099395	30
31	9.794308	264	9.893444	168	9.900864	432	10.099136	29
32	794467	264	893343	168	901124	432	098876	28
33	794626	264	893243	168	901383	432	098617	27
34	794784	264	893142	168	901642	432	098358	26
35	794942	264	893041	168	901901	432	098099	25
36	795101	264	892940	168	902160	432	097840	24
37	795259	264	892839	168	902419	432	097581	23
38	795417	263	892739	168	902679	432	097321	22
39	795575	263	892638	168	902938	432	097062	21
40	795733	263	892536	168	903197	431	096803	20
41	9.795891	263	9.892435	169	9.903455	431	10.096545	19
42	796049	263	892334	169	903714	431	096286	18
43	796206	263	892233	169	903973	431	096027	17
44	796364	262	892132	169	904232	431	095768	16
45	796521	262	892030	169	904491	431	095509	15
46	796679	262	891929	169	904750	431	095250	14
47	796836	262	891827	169	905008	431	094992	13
48	796993	262	891726	169	905267	431	094733	12
49	797150	261	891624	169	905526	431	094474	11
50	797307	261	891523	170	905784	431	094216	10
51	9.797464	261	9.891421	170	9.906043	431	10.093957	9
52	797621	261	891319	170	906302	431	093698	8
53	797777	261	891217	170	906560	431	093440	7
54	797934	261	891115	170	906819	431	093181	6
55	798091	261	891013	170	907077	431	092923	5
56	798247	261	890911	170	907336	431	092664	4
57	798403	260	890809	170	907594	431	092406	3
58	798560	260	890707	170	907852	431	092148	2
59	798716	260	890605	170	908111	430	091889	1
60	798872	260	890503	170	908369	430	091631	0
	Cosine		Sine		Cotang.		Tang.	M.

M.	Sine	D.	Cosine	D.	Tang.	D.	Cotang.	
0	9.798872	260	9.890503	170	9.908369	430	10.091631	60
1	799028	260	890400	171	908623	430	091372	59
2	799184	260	890298	171	908886	430	091114	58
3	799339	259	890195	171	909144	430	090856	57
4	799495	259	890093	171	909402	430	090598	56
5	799651	259	889990	171	909660	430	090340	55
6	799806	259	889888	171	909918	430	090082	54
7	799962	259	889785	171	910177	430	089823	53
8	800117	259	889682	171	910435	430	089565	52
9	800272	258	889579	171	910693	430	089307	51
10	800427	258	889477	171	910951	430	089049	50
11	9.800582	258	9.889374	172	9.911209	430	10.088791	49
12	800737	258	889271	172	911467	430	088533	48
13	800892	258	889168	172	911724	430	088276	47
14	801047	258	889064	172	911982	430	088018	46
15	801201	258	888961	172	912240	430	087760	45
16	801356	257	888858	172	912498	430	087502	44
17	801511	257	888755	172	912756	430	087244	43
18	801665	257	888651	172	913014	429	086986	42
19	801819	257	888548	172	913271	429	086729	41
20	801973	257	888444	173	913529	429	086471	40
21	9.802128	257	9.888341	173	9.913787	429	10.086213	39
22	802282	256	888237	173	914044	429	085956	38
23	802436	256	888134	173	914302	429	085698	37
24	802589	256	888030	173	914560	429	085440	36
25	802743	256	887926	173	914817	429	085183	35
26	802897	256	887822	173	915075	429	084925	34
27	803050	256	887718	173	915332	429	084668	33
28	803204	256	887614	173	915590	429	084410	32
29	803357	255	887510	173	915847	429	084153	31
30	803511	255	887406	174	916104	429	083896	30
31	9.803664	255	9.887302	174	9.916362	429	10.083638	29
32	803817	255	887193	174	916619	429	083381	28
33	803970	255	887093	174	916877	429	083123	27
34	804123	255	886989	174	917134	429	082866	26
35	804276	254	886885	174	917391	429	082609	25
36	804428	254	886780	174	917648	429	082352	24
37	804581	254	886676	174	917905	429	082095	23
38	804734	254	886571	174	918163	428	081837	22
39	804886	254	886466	174	918420	428	081580	21
40	805039	254	886362	175	918677	428	081323	20
41	9.805191	254	9.886257	175	9.918934	428	10.081066	19
42	805343	253	886152	175	919191	428	080809	18
43	805495	253	886047	175	919448	428	080552	17
44	805647	253	885942	175	919705	428	080295	16
45	805799	253	885837	175	919962	428	080038	15
46	805951	253	885732	175	920219	428	079781	14
47	806103	253	885627	175	920476	428	079524	13
48	806254	253	885522	175	920733	428	079267	12
49	806406	252	885416	175	920990	428	079010	11
50	806557	252	885311	176	921247	428	078753	10
51	9.806709	252	9.885205	176	9.921503	428	10.078497	9
52	806860	252	885100	176	921760	428	078240	8
53	807011	252	884994	176	922017	428	077983	7
54	807163	252	884889	176	922274	428	077726	6
55	807314	252	884783	176	922530	428	077470	5
56	807465	251	884677	176	922787	428	077213	4
57	807615	251	884572	176	923044	428	076956	3
58	807766	251	884466	176	923300	428	076700	2
59	807917	251	884360	176	923557	427	076443	1
60	808067	251	884254	177	923813	427	076187	0
	Cosine		Sine		Cotang.		Tang.	M.

M.	Sine	D.	Cosine	D.	Tang.	D.	Cotang.	
0	9-808067	251	9-884254	177	9-923813	427	10-076187	60
1	808218	251	884148	177	924070	427	075930	59
2	808368	251	884042	177	924327	427	075673	58
3	808519	250	883936	177	924583	427	075417	57
4	808669	250	883829	177	924840	427	075160	56
5	808819	250	883723	177	925096	427	074904	55
6	808969	250	883617	177	925352	427	074648	54
7	809119	250	883510	177	925609	427	074391	53
8	809269	250	883404	177	925865	427	074135	52
9	809419	249	883297	178	926122	427	073878	51
10	809569	249	883191	178	926378	427	073622	50
11	9-809718	249	9-883084	178	9-926634	427	10-073366	49
12	809868	249	882977	178	926890	427	073110	48
13	810017	249	882871	178	927147	427	072853	47
14	810167	249	882764	178	927403	427	072597	46
15	810316	248	882657	178	927659	427	072341	45
16	810465	248	882550	178	927915	427	072085	44
17	810614	248	882443	178	928171	427	071829	43
18	810763	248	882336	179	928427	427	071573	42
19	810912	248	882229	179	928683	427	071317	41
20	811061	248	882121	179	928940	427	071060	40
21	9-811210	248	9-882014	179	9-929196	427	10-070804	39
22	811358	247	881907	179	929452	427	070548	38
23	811507	247	881799	179	929708	427	070292	37
24	811655	247	881692	179	929964	426	070036	36
25	811804	247	881584	179	930220	426	069780	35
26	811952	247	881477	179	930475	426	069525	34
27	812100	247	881369	179	930731	426	069269	33
28	812248	247	881261	180	930987	426	069013	32
29	812396	246	881153	180	931243	426	068757	31
30	812544	246	881046	180	931499	426	068501	30
31	9-812692	246	9-880938	180	9-931755	426	10-068245	29
32	812840	246	880830	180	932010	426	067990	28
33	812988	246	880722	180	932266	426	067734	27
34	813135	246	880613	180	932522	426	067478	26
35	813283	246	880505	180	932778	426	067222	25
36	813430	245	880397	180	933033	426	066967	24
37	813578	245	880289	181	933289	426	066711	23
38	813725	245	880180	181	933545	426	066455	22
39	813872	245	880072	181	933800	426	066200	21
40	814019	245	879963	181	934056	426	065944	20
41	9-814166	245	9-879855	181	9-934311	426	10-065689	19
42	814313	245	879746	181	934567	426	065433	18
43	814460	244	879637	181	934823	426	065177	17
44	814607	244	879529	181	935078	426	064922	16
45	814753	244	879420	181	935333	426	064667	15
46	814900	244	879311	181	935589	426	064411	14
47	815046	244	879202	182	935844	426	064156	13
48	815193	244	879093	182	936100	426	063900	12
49	815339	244	878984	182	936355	426	063645	11
50	815485	243	878875	182	936610	426	063390	10
51	9-815631	243	9-878766	182	9-936866	425	10-063134	9
52	815778	243	878656	182	937121	425	062879	8
53	815924	243	878547	182	937376	425	062624	7
54	816069	243	878438	182	937632	425	062368	6
55	816215	243	878328	182	937887	425	062113	5
56	816361	243	878219	183	938142	425	061858	4
57	816507	242	878109	183	938398	425	061602	3
58	816652	242	877999	183	938653	425	061347	2
59	816798	242	877890	183	938908	425	061092	1
60	816943	242	877780	183	939163	425	060837	0
	Cosine		Sine		Cotang.		Tang.	M.

M.	Sine	D.	Cosine	D.	Tang.	D.	Cotang.	
0	9-816943	242	9-877780	183	9-939163	425	10-060837	60
1	817088	242	877670	183	939418	425	060582	59
2	817233	242	877560	183	939673	425	060327	58
3	817379	242	877450	183	939928	425	060072	57
4	817524	241	877340	183	940183	425	059817	56
5	817668	241	877230	184	940438	425	059562	55
6	817813	241	877120	184	940694	425	059306	54
7	817958	241	877010	184	940949	425	059051	53
8	818103	241	876899	184	941204	425	058796	52
9	818247	241	876789	184	941458	425	058542	51
10	818392	241	876678	184	941714	425	058286	50
11	9-818536	240	9-876568	184	9-941968	425	10-058032	49
12	818681	240	876457	184	942223	425	057777	48
13	818825	240	876347	184	942478	425	057522	47
14	818969	240	876236	185	942733	425	057267	46
15	819113	240	876125	185	942988	425	057012	45
16	819257	240	876014	185	943243	425	056757	44
17	819401	240	875904	185	943498	425	056502	43
18	819545	239	875793	185	943752	425	056248	42
19	819689	239	875682	185	944007	425	055993	41
20	819832	239	875571	185	944262	425	055738	40
21	9-819976	239	9-875459	185	9-944517	425	10-055483	39
22	820120	239	875348	185	944771	424	055229	38
23	820263	239	875237	185	945026	424	054974	37
24	820406	239	875126	186	945281	424	054719	36
25	820550	238	875014	186	945535	424	054465	35
26	820693	238	874903	186	945790	424	054210	34
27	820836	238	874791	186	946045	424	053955	33
28	820979	238	874680	186	946299	424	053701	32
29	821122	238	874568	186	946554	424	053446	31
30	821265	238	874456	186	946808	424	053192	30
31	9-821407	238	9-874344	186	9-947063	424	10-052937	29
32	821550	238	874232	187	947318	424	052682	28
33	821693	237	874121	187	947572	424	052428	27
34	821835	237	874009	187	947826	424	052174	26
35	821977	237	873896	187	948081	424	051919	25
36	822120	237	873784	187	948336	424	051664	24
37	822262	237	873672	187	948590	424	051410	23
38	822404	237	873560	187	948844	424	051156	22
39	822546	237	873448	187	949099	424	050901	21
40	822688	236	873335	187	949353	424	050647	20
41	9-822830	236	9-873223	187	9-949607	424	10-050393	19
42	822972	236	873110	188	949862	424	050138	18
43	823114	236	872998	188	950116	424	049884	17
44	823255	236	872885	188	950370	424	049630	16
45	823397	236	872772	188	950625	424	049375	15
46	823539	236	872659	188	950879	424	049121	14
47	823680	235	872547	188	951133	424	048867	13
48	823821	235	872434	188	951388	424	048612	12
49	823963	235	872321	188	951642	424	048358	11
50	824104	235	872208	188	951896	424	048104	10
51	9-824245	235	9-872095	189	9-952150	424	10-047850	9
52	824386	235	871981	189	952405	424	047595	8
53	824527	235	871868	189	952659	424	047341	7
54	824668	234	871755	189	952913	424	047087	6
55	824808	234	871641	189	953167	423	046833	5
56	824949	234	871528	189	953421	423	046579	4
57	825090	234	871414	189	953675	423	046325	3
58	825230	234	871301	189	953929	423	046071	2
59	825371	234	871187	189	954183	423	045817	1
60	825511	234	871073	190	954437	423	045563	0
	Cosine		Sine		Cotang.		Tang.	M.

M.	Sine	D.	Cosine	D.	Tang.	D.	Cotang.	
0	9.825511	234	9.871073	190	9.954437	423	10.04553	60.
1	825651	233	870900	190	954691	423	045309	59
2	825791	233	870846	190	954945	423	045055	58
3	825931	233	870792	190	955200	423	044800	57
4	826071	233	870618	190	955454	423	044546	56
5	826211	233	870504	190	955707	423	044293	55
6	826351	233	870390	190	955961	423	044039	54
7	826491	233	870276	190	956215	423	043785	53
8	826631	233	870161	190	956469	423	043531	52
9	826770	232	870047	191	956723	423	043277	51
10	826910	232	869933	191	956977	423	043023	50
11	9.827049	232	9.869818	191	9.957231	423	10.042769	49
12	827189	232	869704	191	957485	423	042515	48
13	827328	232	869589	191	957739	423	042261	47
14	827467	232	869474	191	957993	423	042007	46
15	827606	232	869360	191	958246	423	041754	45
16	827745	232	869245	191	958500	423	041500	44
17	827884	231	869130	191	958754	423	041246	43
18	828023	231	869015	192	959008	423	040992	42
19	828162	231	868900	192	959262	423	040738	41
20	828301	231	868785	192	959516	423	040484	40
21	9.828439	231	9.868670	192	9.959769	423	10.040231	39
22	828578	231	868555	192	960023	423	039977	38
23	828716	231	868440	192	960277	423	039723	37
24	828855	230	868324	192	960531	423	039469	36
25	828993	230	868209	192	960784	423	039216	35
26	829131	230	868093	192	961038	423	038962	34
27	829269	230	867978	193	961291	423	038709	33
28	829407	230	867862	193	961545	423	038455	32
29	829545	230	867747	193	961799	423	038201	31
30	829683	230	867631	193	962052	423	037948	30
31	9.829821	229	9.867515	193	9.962306	423	10.037694	29
32	829959	229	867399	193	962560	423	037440	28
33	830097	229	867283	193	962813	423	037187	27
34	830234	229	867167	193	963067	423	036933	26
35	830372	229	867051	193	963320	423	036680	25
36	830509	229	866935	194	963574	423	036426	24
37	830646	229	866819	194	963827	423	036173	23
38	830784	229	866703	194	964081	423	035919	22
39	830921	228	866586	194	964335	423	035665	21
40	831058	228	866470	194	964588	422	035412	20
41	9.831195	228	9.866353	194	9.964842	422	10.035158	19
42	831332	228	866237	194	965095	422	034905	18
43	831469	228	866120	194	965349	422	034651	17
44	831606	228	866004	195	965602	422	034398	16
45	831742	228	865887	195	965855	422	034145	15
46	831879	228	865770	195	966109	422	033891	14
47	832015	227	865653	195	966362	422	033638	13
48	832152	227	865536	195	966616	422	033384	12
49	832288	227	865419	195	966869	422	033131	11
50	832425	227	865302	195	967123	422	032877	10
51	9.832561	227	9.865185	195	9.967376	422	10.032624	9
52	832707	227	865068	195	967629	422	032371	8
53	832843	227	864950	195	967883	422	032117	7
54	832969	226	864833	196	968136	422	031864	6
55	833105	226	864716	196	968389	422	031611	5
56	833241	226	864598	196	968643	422	031357	4
57	833377	226	864481	196	968896	422	031104	3
58	833512	226	864363	196	969149	422	030851	2
59	833648	226	864245	196	969403	422	030597	1
60	833783	226	864127	196	969656	422	030344	0
	Cosine		Sine		Cotang.		Tang.	M.

M.	Sine	D.	Cosine	D.	Tang.	D.	Cotang.	
0	9833783	226	9864127	196	9969656	422	10-030344	60
1	833919	225	864010	196	969909	422	030091	59
2	834054	225	863892	197	970162	422	029838	58
3	834189	225	863774	197	970416	422	029584	57
4	834325	225	863656	197	970669	422	029331	56
5	834460	225	863538	197	970922	422	029078	55
6	834595	225	863419	197	971175	422	028825	54
7	834730	225	863301	197	971429	422	028571	53
8	834865	225	863183	197	971682	422	028318	52
9	834999	224	863064	197	971935	422	028065	51
10	835134	224	862946	198	972188	422	027812	50
11	9835269	224	9862827	198	9972441	422	10-027559	49
12	835403	224	862709	198	972694	422	027306	48
13	835538	224	862590	198	972948	422	027052	47
14	835672	224	862471	198	973201	422	026799	46
15	835807	224	862353	198	973454	422	026546	45
16	835941	224	862234	198	973707	422	026293	44
17	836075	223	862115	198	973960	422	026040	43
18	836209	223	861996	198	974213	422	025787	42
19	836343	223	861877	198	974466	422	025534	41
20	836477	223	861758	199	974719	422	025281	40
21	9836611	223	9861638	199	9974973	422	10-025027	39
22	836745	223	861519	199	975226	422	024774	38
23	836878	223	861400	199	975479	422	024521	37
24	837012	222	861280	199	975732	422	024268	36
25	837146	222	861161	199	975985	422	024015	35
26	837279	222	861041	199	976238	422	023762	34
27	837412	222	860922	199	976491	422	023509	33
28	837546	222	860802	199	976744	422	023256	32
29	837679	222	860682	200	976997	422	023003	31
30	837812	222	860562	200	977250	422	022750	30
31	9837945	222	9860442	200	9977503	422	10-022497	29
32	838078	221	860322	200	977756	422	022244	28
33	838211	221	860202	200	978009	422	021991	27
34	838344	221	860082	200	978262	422	021738	26
35	838477	221	859962	200	978515	422	021485	25
36	838610	221	859842	200	978768	422	021232	24
37	838742	221	859721	201	979021	422	020979	23
38	838875	221	859601	201	979274	422	020726	22
39	839007	221	859480	201	979527	422	020473	21
40	839140	220	859360	201	979780	422	020220	20
41	9839272	220	9859239	201	9980033	422	10-019967	19
42	839404	220	859119	201	980286	422	019714	18
43	839536	220	858998	201	980538	422	019462	17
44	839668	220	858877	201	980791	421	019209	16
45	839800	220	858756	202	981044	421	018956	15
46	839932	220	858635	202	981297	421	018703	14
47	840064	219	858514	202	981550	421	018450	13
48	840196	219	858393	202	981803	421	018197	12
49	840328	219	858272	202	982056	421	017944	11
50	840459	219	858151	202	982309	421	017691	10
51	9840591	219	9858029	202	9982562	421	10-017438	9
52	840722	219	857908	202	982814	421	017186	8
53	840854	219	857786	202	983067	421	016933	7
54	840985	219	857665	203	983320	421	016680	6
55	841116	218	857543	203	983573	421	016427	5
56	841247	218	857422	203	983826	421	016174	4
57	841378	218	857300	203	984079	421	015921	3
58	841509	218	857178	203	984331	421	015669	2
59	841640	218	857056	203	984584	421	015416	1
60	841771	218	856934	203	984837	421	015163	0
	Cosine		Sine		Cotang.		Tang.	M.

M.	Sine	D.	Cosine	D.	Tang.	D.	Cotang.	
0	9841771	218	9856934	203	9984837	421	10015163	60
1	841902	218	856812	203	985090	421	014910	59
2	842033	218	856690	204	985343	421	014657	58
3	842163	217	856568	204	985596	421	014404	57
4	842294	217	856446	204	985848	421	014152	56
5	842424	217	856323	204	986101	421	013899	55
6	842555	217	856201	204	986354	421	013646	54
7	842685	217	856078	204	986607	421	013393	53
8	842815	217	855956	204	986860	421	013140	52
9	842946	217	855833	204	987112	421	012888	51
10	843076	217	855711	205	987365	421	012635	50
11	9843206	216	9855588	205	9987618	421	10012382	49
12	843336	216	855465	205	987871	421	012129	48
13	843466	216	855342	205	988123	421	011877	47
14	843595	216	855219	205	988376	421	011624	46
15	843725	216	855096	205	988629	421	011371	45
16	843855	216	854973	205	988882	421	011118	44
17	843984	216	854850	205	989134	421	010866	43
18	844114	215	854727	206	989387	421	010613	42
19	844243	215	854603	206	989640	421	010360	41
20	844372	215	854480	206	989893	421	010107	40
21	9844502	215	9854356	206	9990145	421	10009855	39
22	844631	215	854233	206	990398	421	009602	38
23	844760	215	854109	206	990651	421	009349	37
24	844889	215	853986	206	990903	421	009097	36
25	845018	215	853862	206	991156	421	008844	35
26	845147	215	853738	206	991409	421	008591	34
27	845276	214	853614	207	991662	421	008338	33
28	845405	214	853490	207	991914	421	008086	32
29	845533	214	853366	207	992167	421	007833	31
30	845662	214	853242	207	992420	421	007580	30
31	9845790	214	9853118	207	9992672	421	10007328	29
32	845919	214	852994	207	992925	421	007075	28
33	846047	214	852869	207	993178	421	006822	27
34	846175	214	852745	207	993430	421	006570	26
35	846304	214	852620	207	993683	421	006317	25
36	846432	213	852496	208	993936	421	006064	24
37	846560	213	852371	208	994189	421	005811	23
38	846688	213	852247	208	994441	421	005559	22
39	846816	213	852122	208	994694	421	005306	21
40	846944	213	851997	208	994947	421	005053	20
41	9847071	213	9851872	208	9995199	421	10004801	19
42	847199	213	851747	208	995452	421	004548	18
43	847327	213	851622	208	995705	421	004295	17
44	847454	212	851497	209	995957	421	004043	16
45	847582	212	851372	209	996210	421	003790	15
46	847709	212	851246	209	996463	421	003537	14
47	847836	212	851121	209	996715	421	003285	13
48	847964	212	850996	209	996968	421	003032	12
49	848091	212	850870	209	997221	421	002779	11
50	848218	212	850745	209	997473	421	002527	10
51	9848345	212	9850619	209	9997726	421	10002274	9
52	848472	211	850493	210	997979	421	002021	8
53	848599	211	850368	210	998231	421	001769	7
54	848726	211	850242	210	998484	421	001516	6
55	848852	211	850116	210	998737	421	001263	5
56	848979	211	849990	210	998989	421	001011	4
57	849106	211	849864	210	999242	421	000758	3
58	849232	211	849738	210	999495	421	000505	2
59	849359	211	849611	210	999748	421	000253	1
60	849485	211	849485	210	10000000	421	000000	0
	Cosine		Sine		Cotang.		Tang.	M.

TRAVERSE TABLE,
SHOWING THE DIFFERENCE OF
LATITUDE AND DEPARTURE
FOR
DISTANCES BETWEEN 1 AND 100;
AND FOR
ANGLES TO QUARTER DEGREES BETWEEN 1° AND 90° .

Distance.	$\frac{1}{4}$ DEG.		$\frac{1}{2}$ DEG.		$\frac{3}{4}$ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	1-00	0-30	1-00	0-01	1-00	0-01	1
2	2-00	0-01	2-00	0-02	2-00	0-03	2
3	3-00	0-01	3-00	0-03	3-00	0-04	3
4	4-00	0-02	4-00	0-03	4-00	0-05	4
5	5-00	0-02	5-00	0-04	5-00	0-07	5
6	6-00	0-03	6-00	0-05	6-00	0-08	6
7	7-00	0-03	7-00	0-06	7-00	0-09	7
8	8-00	0-03	8-00	0-07	8-00	0-10	8
9	9-00	0-04	9-00	0-08	9-00	0-12	9
10	10-00	0-04	10-00	0-09	10-00	0-13	10
11	11-00	0-05	11-00	0-10	11-00	0-14	11
12	12-00	0-05	12-00	0-10	12-00	0-16	12
13	13-00	0-06	13-00	0-11	13-00	0-17	13
14	14-00	0-06	14-00	0-12	14-00	0-18	14
15	15-00	0-07	15-00	0-13	15-00	0-20	15
16	16-00	0-07	16-00	0-14	16-00	0-21	16
17	17-00	0-07	17-00	0-15	17-00	0-22	17
18	18-00	0-08	18-00	0-16	18-00	0-24	18
19	19-00	0-08	19-00	0-17	19-00	0-25	19
20	20-00	0-09	20-00	0-17	20-00	0-26	20
21	21-00	0-09	21-00	0-18	21-00	0-27	21
22	22-00	0-10	22-00	0-19	22-00	0-29	22
23	23-00	0-10	23-00	0-20	23-00	0-30	23
24	24-00	0-10	24-00	0-21	24-00	0-31	24
25	25-00	0-11	25-00	0-22	25-00	0-33	25
26	26-00	0-11	26-00	0-23	26-00	0-34	26
27	27-00	0-12	27-00	0-24	27-00	0-35	27
28	28-00	0-12	28-00	0-24	28-00	0-37	28
29	29-00	0-13	29-00	0-25	29-00	0-38	29
30	30-00	0-13	30-00	0-26	30-00	0-39	30
31	31-00	0-14	31-00	0-27	31-00	0-41	31
32	32-00	0-14	32-00	0-28	32-00	0-42	32
33	33-00	0-14	33-00	0-29	33-00	0-43	33
34	34-00	0-15	34-00	0-30	34-00	0-45	34
35	35-00	0-15	35-00	0-31	35-00	0-46	35
36	36-00	0-16	36-00	0-31	36-00	0-47	36
37	37-00	0-16	37-00	0-32	37-00	0-48	37
38	38-00	0-17	38-00	0-33	38-00	0-50	38
39	39-00	0-17	39-00	0-34	39-00	0-51	39
40	40-00	0-17	40-00	0-35	40-00	0-52	40
41	41-00	0-18	41-00	0-36	41-00	0-54	41
42	42-00	0-18	42-00	0-37	42-00	0-55	42
43	43-00	0-19	43-00	0-38	43-00	0-56	43
44	44-00	0-19	44-00	0-38	44-00	0-58	44
45	45-00	0-20	45-00	0-39	45-00	0-59	45
46	46-00	0-20	46-00	0-40	46-00	0-60	46
47	47-00	0-21	47-00	0-41	47-00	0-62	47
48	48-00	0-21	48-00	0-42	48-00	0-63	48
49	49-00	0-21	49-00	0-43	49-00	0-64	49
50	50-00	0-22	50-00	0-44	50-00	0-65	50
Distance.	$89\frac{1}{4}$ DEG.		$89\frac{1}{2}$ DEG.		$89\frac{3}{4}$ DEG.		Distance.
	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	

Distance.	$\frac{1}{4}$ DEG.		$\frac{1}{2}$ DEG.		$\frac{3}{4}$ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	51°00	0°22	51°00	0°45	51°00	0°67	51
52	52°00	0°23	52°00	0°45	52°00	0°68	52
53	53°00	0°23	53°00	0°46	53°00	0°69	53
54	54°00	0°24	54°00	0°47	54°00	0°71	54
55	55°00	0°24	55°00	0°48	55°00	0°72	55
56	56°00	0°24	56°00	0°49	56°00	0°73	56
57	57°00	0°25	57°00	0°50	57°00	0°75	57
58	58°00	0°25	58°00	0°51	57°59	0°76	58
59	59°00	0°26	59°00	0°51	58°59	0°77	59
60	60°00	0°26	60°00	0°52	59°59	0°79	60
61	61°00	0°27	61°00	0°53	60°59	0°80	61
62	62°00	0°27	62°00	0°54	61°59	0°81	62
63	63°00	0°27	63°00	0°55	62°59	0°82	63
64	64°00	0°28	64°00	0°56	63°59	0°84	64
65	65°00	0°28	65°00	0°57	64°59	0°85	65
66	66°00	0°29	66°00	0°58	65°59	0°86	66
67	67°00	0°29	67°00	0°58	66°59	0°88	67
68	68°00	0°30	68°00	0°59	67°59	0°89	68
69	69°00	0°30	69°00	0°60	68°59	0°90	69
70	70°00	0°31	70°00	0°61	69°59	0°92	70
71	71°00	0°31	71°00	0°62	70°59	0°93	71
72	72°00	0°31	72°00	0°63	71°59	0°94	72
73	73°00	0°32	73°00	0°64	72°59	0°96	73
74	74°00	0°32	74°00	0°65	73°59	0°97	74
75	75°00	0°33	75°00	0°65	74°59	0°98	75
76	76°00	0°33	76°00	0°66	75°59	0°99	76
77	77°00	0°34	77°00	0°67	76°59	1°01	77
78	78°00	0°34	78°00	0°68	77°59	1°02	78
79	79°00	0°34	79°00	0°69	78°59	1°03	79
80	80°00	0°35	80°00	0°70	79°59	1°05	80
81	81°00	0°35	81°00	0°71	80°59	1°06	81
82	82°00	0°36	82°00	0°72	81°59	1°07	82
83	83°00	0°36	83°00	0°72	82°59	1°09	83
84	84°00	0°37	84°00	0°73	83°59	1°10	84
85	85°00	0°37	85°00	0°74	84°59	1°11	85
86	86°00	0°38	86°00	0°75	85°59	1°13	86
87	87°00	0°38	87°00	0°76	86°59	1°14	87
88	88°00	0°38	88°00	0°77	87°59	1°15	88
89	89°00	0°39	89°00	0°78	88°59	1°16	89
90	90°00	0°39	90°00	0°79	89°59	1°18	90
91	91°00	0°40	91°00	0°79	90°59	1°19	91
92	92°00	0°40	92°00	0°80	91°59	1°20	92
93	93°00	0°41	93°00	0°81	92°59	1°22	93
94	94°00	0°41	94°00	0°82	93°59	1°23	94
95	95°00	0°41	95°00	0°83	94°59	1°24	95
96	96°00	0°42	96°00	0°84	95°59	1°26	96
97	97°00	0°42	97°00	0°85	96°59	1°27	97
98	98°00	0°43	98°00	0°86	97°59	1°28	98
99	99°00	0°43	99°00	0°86	98°59	1°30	99
100	100°00	0°44	100°00	0°87	99°59	1°31	100
Distance.	89 $\frac{1}{4}$ DEG.		89 $\frac{1}{2}$ DEG.		89 $\frac{3}{4}$ DEG.		Distance.
	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	

Distance.	1 DEG.		1 $\frac{1}{2}$ DEG.		1 $\frac{1}{2}$ DEG.		1 $\frac{1}{2}$ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	1-00	0-02	1-00	0-02	1-00	0-03	1-00	0-03	1
2	2-00	0-03	2-00	0-04	2-00	0-05	2-00	0-06	2
3	3-00	0-05	3-00	0-07	3-00	0-08	3-00	0-09	3
4	4-00	0-07	4-00	0-09	4-00	0-10	4-00	0-12	4
5	5-00	0-09	5-00	0-11	5-00	0-13	5-00	0-15	5
6	6-00	0-10	6-00	0-13	6-00	0-16	6-00	0-18	6
7	7-00	0-12	7-00	0-15	7-00	0-18	7-00	0-21	7
8	8-00	0-14	8-00	0-17	8-00	0-21	8-00	0-25	8
9	9-00	0-16	9-00	0-20	9-00	0-24	9-00	0-28	9
10	10-00	0-17	10-00	0-22	10-00	0-26	10-00	0-31	10
11	11-00	0-19	11-00	0-24	11-00	0-28	10-99	0-34	11
12	12-00	0-21	12-00	0-26	12-00	0-31	11-99	0-37	12
13	13-00	0-23	13-00	0-28	13-00	0-34	12-99	0-40	13
14	14-00	0-24	14-00	0-31	14-00	0-37	13-99	0-43	14
15	15-00	0-26	15-00	0-33	14-99	0-39	14-99	0-46	15
16	16-00	0-28	16-00	0-35	15-99	0-42	15-99	0-49	16
17	17-00	0-30	17-00	0-37	16-99	0-45	16-99	0-52	17
18	18-00	0-31	18-00	0-39	17-99	0-47	17-99	0-55	18
19	19-00	0-33	19-00	0-41	18-99	0-50	18-99	0-58	19
20	20-00	0-35	20-00	0-44	19-99	0-52	19-99	0-61	20
21	21-00	0-37	21-00	0-46	20-99	0-55	20-99	0-64	21
22	22-00	0-38	21-99	0-48	21-99	0-58	21-99	0-67	22
23	23-00	0-40	22-99	0-50	22-99	0-60	22-99	0-70	23
24	24-00	0-42	23-99	0-52	23-99	0-63	23-99	0-73	24
25	25-00	0-44	24-99	0-55	24-99	0-65	24-99	0-76	25
26	26-00	0-45	25-99	0-57	25-99	0-68	25-99	0-79	26
27	27-00	0-47	26-99	0-59	26-99	0-71	26-99	0-83	27
28	28-00	0-49	27-99	0-61	27-99	0-73	27-99	0-86	28
29	29-00	0-51	28-99	0-63	28-99	0-76	28-99	0-89	29
30	30-00	0-52	29-99	0-65	29-99	0-79	29-99	0-92	30
31	31-00	0-54	30-99	0-68	30-99	0-81	30-99	0-95	31
32	32-00	0-56	31-99	0-70	31-99	0-84	31-99	0-98	32
33	32-99	0-58	32-99	0-72	32-99	0-86	32-98	1-01	33
34	33-99	0-59	33-99	0-74	33-99	0-89	33-98	1-04	34
35	34-99	0-61	34-99	0-76	34-99	0-92	34-98	1-07	35
36	35-99	0-63	35-99	0-79	35-99	0-94	35-98	1-10	36
37	36-99	0-65	36-99	0-81	36-99	0-97	36-98	1-13	37
38	37-99	0-66	37-99	0-83	37-99	0-99	37-98	1-16	38
39	38-99	0-68	38-99	0-85	38-99	1-02	38-98	1-19	39
40	39-99	0-70	39-99	0-87	39-99	1-05	39-98	1-22	40
41	40-99	0-72	40-99	0-89	40-99	1-07	40-98	1-25	41
42	41-99	0-73	41-99	0-92	41-99	1-10	41-98	1-28	42
43	42-99	0-75	42-99	0-94	42-99	1-13	42-98	1-31	43
44	43-99	0-77	43-99	0-96	43-99	1-15	43-98	1-34	44
45	44-99	0-79	44-99	0-98	44-99	1-18	44-98	1-37	45
46	45-99	0-80	45-99	1-00	45-99	1-20	45-98	1-40	46
47	46-99	0-82	46-99	1-03	46-99	1-23	46-98	1-44	47
48	47-99	0-84	47-99	1-05	47-98	1-26	47-98	1-47	48
49	48-99	0-86	48-99	1-07	48-98	1-28	48-98	1-50	49
50	49-99	0-87	49-99	1-09	49-98	1-31	49-98	1-53	50
Distance.	89 DEG.		88 $\frac{1}{2}$ DEG.		88 $\frac{1}{2}$ DEG.		88 $\frac{1}{2}$ DEG.		Distance.
	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	

Distance.	1 DEG.		1¼ DEG.		1½ DEG.		1¾ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	50-99	0-89	53-99	1-11	50-98	1-34	50-98	1-56	51
52	51-99	0-91	51-99	1-13	51-98	1-36	51-98	1-59	52
53	52-99	0-92	52-99	1-16	52-98	1-39	52-98	1-62	53
54	53-99	0-94	53-99	1-18	53-98	1-41	53-97	1-65	54
55	54-99	0-96	54-99	1-20	54-98	1-44	54-97	1-68	55
56	55-99	0-98	55-99	1-22	55-98	1-47	55-97	1-71	56
57	56-99	0-99	56-99	1-24	56-98	1-49	56-97	1-74	57
58	57-99	1-01	57-99	1-27	57-98	1-52	57-97	1-77	58
59	58-99	1-03	58-99	1-29	58-98	1-54	58-97	1-80	59
60	59-99	1-05	59-99	1-31	59-98	1-57	59-97	1-83	60
61	60-99	1-06	60-99	1-33	60-98	1-60	60-97	1-86	61
62	61-99	1-08	61-99	1-35	61-98	1-62	61-97	1-89	62
63	62-99	1-10	62-99	1-37	62-98	1-65	62-97	1-92	63
64	63-99	1-12	63-98	1-40	63-98	1-68	63-97	1-95	64
65	64-99	1-13	64-98	1-42	64-98	1-70	64-97	1-99	65
66	65-99	1-15	65-98	1-44	65-98	1-73	65-97	2-02	66
67	66-99	1-17	66-98	1-46	66-98	1-75	66-97	2-05	67
68	67-99	1-19	67-98	1-48	67-98	1-78	67-97	2-08	68
69	68-99	1-20	68-98	1-51	68-98	1-81	68-97	2-11	69
70	69-99	1-22	69-98	1-53	69-98	1-83	69-97	2-14	70
71	70-99	1-24	70-98	1-55	70-98	1-86	70-97	2-17	71
72	71-99	1-26	71-98	1-57	71-98	1-88	71-97	2-20	72
73	72-99	1-27	72-98	1-59	72-97	1-91	72-97	2-23	73
74	73-99	1-29	73-98	1-61	73-97	1-94	73-97	2-26	74
75	74-99	1-31	74-98	1-64	74-97	1-96	74-97	2-29	75
76	75-99	1-33	75-98	1-66	75-97	1-99	75-96	2-32	76
77	76-99	1-34	76-98	1-68	76-97	2-02	76-96	2-35	77
78	77-99	1-36	77-98	1-70	77-97	2-04	77-96	2-38	78
79	78-99	1-38	78-98	1-72	78-97	2-07	78-96	2-41	79
80	79-99	1-40	79-98	1-75	79-97	2-09	79-96	2-44	80
81	80-99	1-41	80-98	1-77	80-97	2-12	80-96	2-47	81
82	81-99	1-43	81-98	1-79	81-97	2-15	81-96	2-50	82
83	82-99	1-45	82-98	1-81	82-97	2-17	82-96	2-53	83
84	83-99	1-47	83-98	1-83	83-97	2-20	83-96	2-57	84
85	84-99	1-48	84-98	1-85	84-97	2-23	84-96	2-60	85
86	85-99	1-50	85-98	1-88	85-97	2-25	85-96	2-63	86
87	86-99	1-52	86-98	1-90	86-97	2-28	86-96	2-66	87
88	87-99	1-54	87-98	1-92	87-97	2-30	87-96	2-69	88
89	88-99	1-55	88-98	1-94	88-97	2-33	88-96	2-72	89
90	89-99	1-57	89-98	1-96	89-97	2-36	89-96	2-75	90
91	90-99	1-59	90-98	1-99	90-97	2-38	90-96	2-78	91
92	91-99	1-61	91-98	2-01	91-97	2-41	91-96	2-81	92
93	92-99	1-62	92-98	2-03	92-97	2-43	92-96	2-84	93
94	93-99	1-64	93-98	2-05	93-97	2-46	93-96	2-87	94
95	94-99	1-66	94-98	2-07	94-97	2-49	94-96	2-90	95
96	95-99	1-68	95-98	2-09	95-97	2-51	95-96	2-94	96
97	96-99	1-69	96-98	2-12	96-97	2-54	96-95	2-96	97
98	97-99	1-71	97-98	2-14	97-97	2-57	97-95	2-99	98
99	98-98	1-73	98-98	2-16	98-97	2-59	98-95	3-02	99
100	99-98	1-75	99-98	2-18	99-97	2-62	99-95	3-05	100
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	89 DEG.		88¼ DEG.		88½ DEG.		88¾ DEG.		

Distance.	2 DEG.		2 $\frac{1}{4}$ DEG.		2 $\frac{1}{2}$ DEG.		2 $\frac{3}{4}$ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	1-00	0-03	1-00	0-04	1-00	0-04	1-00	0-05	1
2	2-00	0-07	2-00	0-08	2-00	0-09	2-00	0-10	2
3	3-00	0-10	3-00	0-12	3-00	0-13	3-00	0-14	3
4	4-00	0-14	4-00	0-16	4-00	0-17	4-00	0-19	4
5	5-00	0-17	5-00	0-20	5-00	0-22	4-99	0-24	5
6	6-00	0-21	6-00	0-24	5-99	0-26	5-99	0-29	6
7	7-00	0-24	6-99	0-27	6-99	0-31	6-99	0-34	7
8	7-99	0-28	7-99	0-31	7-99	0-35	7-99	0-38	8
9	8-99	0-31	8-99	0-35	8-99	0-39	8-99	0-43	9
10	9-99	0-35	9-99	0-39	9-99	0-44	9-99	0-48	10
11	10-99	0-38	10-99	0-43	10-99	0-48	10-99	0-53	11
12	11-99	0-42	11-99	0-47	11-99	0-52	11-99	0-58	12
13	12-99	0-45	12-99	0-51	12-99	0-57	12-99	0-62	13
14	13-99	0-49	13-99	0-55	13-99	0-61	12-98	0-67	14
15	14-99	0-52	14-99	0-59	14-99	0-65	14-98	0-72	15
16	15-99	0-56	15-99	0-63	15-99	0-70	15-98	0-77	16
17	16-99	0-59	16-99	0-67	16-98	0-74	16-98	0-82	17
18	17-99	0-63	17-99	0-71	17-98	0-79	17-98	0-86	18
19	18-99	0-66	18-99	0-75	18-98	0-83	18-98	0-91	19
20	19-99	0-70	19-98	0-79	19-98	0-87	19-98	0-96	20
21	20-99	0-73	20-98	0-82	20-98	0-92	20-98	1-01	21
22	21-99	0-77	21-98	0-86	21-98	0-96	21-97	1-06	22
23	22-99	0-80	22-98	0-90	22-98	1-00	22-97	1-10	23
24	23-99	0-84	23-98	0-94	23-98	1-05	23-97	1-15	24
25	24-98	0-87	24-98	0-98	24-98	1-09	24-97	1-20	25
26	25-98	0-91	25-98	1-02	25-98	1-13	25-97	1-25	26
27	26-98	0-94	26-98	1-06	26-97	1-18	26-97	1-30	27
28	27-98	0-98	27-98	1-10	27-97	1-22	27-97	1-34	28
29	28-98	1-01	28-98	1-14	28-97	1-26	28-97	1-39	29
30	29-98	1-05	29-98	1-18	29-97	1-31	29-97	1-44	30
31	30-98	1-08	30-98	1-22	30-97	1-35	30-96	1-49	31
32	31-98	1-12	31-98	1-26	31-97	1-40	31-96	1-54	32
33	32-98	1-15	32-97	1-30	32-97	1-44	32-96	1-58	33
34	33-98	1-19	33-97	1-33	33-97	1-48	33-96	1-63	34
35	34-98	1-22	34-97	1-37	34-97	1-53	34-96	1-68	35
36	35-98	1-26	35-97	1-41	35-97	1-57	35-96	1-73	36
37	36-98	1-29	36-97	1-45	36-96	1-61	36-96	1-78	37
38	37-98	1-33	37-97	1-49	37-96	1-66	37-96	1-82	38
39	38-98	1-36	38-97	1-53	38-96	1-70	38-96	1-87	39
40	39-98	1-40	39-97	1-57	39-96	1-75	39-95	1-92	40
41	40-98	1-43	40-97	1-61	40-96	1-77	40-95	1-97	41
42	41-97	1-47	41-97	1-65	41-96	1-83	41-95	2-02	42
43	42-97	1-50	42-97	1-69	42-96	1-88	42-95	2-06	43
44	43-97	1-54	43-97	1-73	43-96	1-92	43-95	2-11	44
45	44-97	1-57	44-97	1-77	44-96	1-96	44-95	2-16	45
46	45-97	1-61	45-96	1-81	45-96	2-01	45-95	2-21	46
47	46-97	1-64	46-96	1-85	46-96	2-05	46-95	2-25	47
48	47-97	1-68	47-96	1-88	47-95	2-09	47-95	2-30	48
49	48-97	1-71	48-96	1-92	48-95	2-14	48-94	2-35	49
50	49-97	1-74	49-96	1-96	49-95	2-18	49-94	2-40	50
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	88 DEG.		87 $\frac{3}{4}$ DEG.		87 $\frac{1}{2}$ DEG.		87 $\frac{1}{4}$ DEG.		

Distance.	2 DEG.		2½ DEG.		2½ DEG.		2½ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	50-97	1-78	50-96	2-09	50-95	2-22	50-94	2-45	51
52	51-97	1-81	51-96	2-04	51-95	2-27	51-94	2-50	52
53	52-97	1-85	52-96	2-08	52-95	2-31	52-94	2-54	53
54	53-97	1-88	53-96	2-12	53-95	2-36	53-94	2-59	54
55	54-97	1-92	54-96	2-16	54-95	2-40	54-94	2-64	55
56	55-97	1-95	55-96	2-20	55-95	2-44	55-94	2-69	56
57	56-97	1-99	56-96	2-24	56-95	2-49	56-94	2-73	57
58	57-96	2-02	57-96	2-28	57-94	2-53	57-93	2-78	58
59	58-96	2-06	58-95	2-32	58-94	2-57	58-93	2-83	59
60	59-96	2-09	59-95	2-36	59-94	2-62	59-93	2-88	60
61	60-96	2-13	60-95	2-39	60-94	2-66	60-93	2-93	61
62	61-96	2-16	61-95	2-43	61-94	2-70	61-93	2-97	62
63	62-96	2-20	62-95	2-47	62-94	2-75	62-93	3-02	63
64	63-96	2-23	63-95	2-51	63-94	2-79	63-93	3-07	64
65	64-96	2-27	64-95	2-55	64-94	2-84	64-93	3-12	65
66	65-96	2-30	65-95	2-59	65-94	2-88	65-92	3-17	66
67	66-96	2-34	66-95	2-63	66-94	2-92	66-92	3-21	67
68	67-96	2-37	67-95	2-67	67-94	2-97	67-92	3-26	68
69	68-96	2-41	68-95	2-71	68-93	3-01	68-92	3-31	69
70	69-96	2-44	69-95	2-75	69-93	3-05	69-92	3-36	70
71	70-96	2-48	70-95	2-79	70-93	3-10	70-92	3-41	71
72	71-96	2-51	71-94	2-83	71-93	3-14	71-92	3-45	72
73	72-96	2-55	72-94	2-87	72-93	3-18	72-92	3-50	73
74	73-95	2-58	73-94	2-91	73-93	3-23	73-91	3-55	74
75	74-95	2-62	74-94	2-94	74-93	3-27	74-91	3-60	75
76	75-95	2-65	75-94	2-98	75-93	3-31	75-91	3-65	76
77	76-95	2-69	76-94	3-02	76-93	3-36	76-91	3-70	77
78	77-95	2-72	77-94	3-06	77-93	3-40	77-91	3-74	78
79	78-95	2-76	78-94	3-10	78-92	3-45	78-91	3-79	79
80	79-95	2-79	79-94	3-14	79-92	3-49	79-91	3-84	80
81	80-95	2-83	80-94	3-18	80-92	3-53	80-91	3-89	81
82	81-95	2-86	81-94	3-22	81-92	3-58	81-91	3-93	82
83	82-95	2-90	82-94	3-26	82-92	3-62	82-90	3-98	83
84	83-95	2-93	83-94	3-30	83-92	3-66	83-90	4-03	84
85	84-95	2-97	84-93	3-34	84-92	3-71	84-90	4-08	85
86	85-95	3-00	85-93	3-38	85-92	3-75	85-90	4-13	86
87	86-95	3-04	86-93	3-42	86-92	3-79	86-90	4-17	87
88	87-95	3-07	87-93	3-45	87-92	3-84	87-90	4-22	88
89	88-95	3-11	88-93	3-49	88-92	3-88	88-90	4-27	89
90	89-95	3-14	89-93	3-53	89-91	3-93	89-90	4-32	90
91	90-95	3-18	90-93	3-57	90-91	3-97	90-90	4-37	91
92	91-94	3-21	91-93	3-61	91-91	4-01	91-89	4-41	92
93	92-94	3-25	92-93	3-65	92-91	4-06	92-89	4-46	93
94	93-94	3-28	93-93	3-69	93-91	4-10	93-89	4-51	94
95	94-94	3-32	94-93	3-73	94-91	4-14	94-89	4-56	95
96	95-94	3-35	95-93	3-77	95-91	4-19	95-89	4-61	96
97	96-94	3-39	96-93	3-81	96-91	4-23	96-89	4-65	97
98	97-94	3-42	97-92	3-85	97-91	4-27	97-89	4-70	98
99	98-94	3-46	98-92	3-89	98-91	4-32	98-89	4-75	99
100	99-94	3-49	99-92	3-93	99-91	4-36	99-88	4-80	100
Distance.	88 DEG.		87½ DEG.		87½ DEG.		87½ DEG.		Distance.
	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	

Distance.	3 DEG.		3 $\frac{1}{4}$ DEG.		3 $\frac{1}{2}$ DEG.		3 $\frac{3}{4}$ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	1-00	0-05	1-00	0-06	1-00	0-06	1-00	0-06	1
2	2-00	0-10	2-00	0-11	2-00	0-12	2-00	0-13	2
3	3-00	0-16	3-00	0-17	2-99	0-18	2-99	0-20	3
4	3-99	0-21	3-99	0-23	3-99	0-24	3-99	0-26	4
5	4-99	0-26	4-99	0-28	4-99	0-31	4-99	0-33	5
6	5-99	0-31	5-99	0-34	5-99	0-37	5-99	0-39	6
7	6-99	0-37	6-99	0-40	6-99	0-43	6-99	0-46	7
8	7-99	0-42	7-99	0-45	7-99	0-49	7-98	0-52	8
9	8-99	0-47	8-99	0-51	8-98	0-55	8-98	0-59	9
10	9-99	0-52	9-98	0-57	9-98	0-61	9-98	0-65	10
11	10-98	0-58	10-98	0-62	10-98	0-67	10-98	0-72	11
12	11-98	0-63	11-98	0-68	11-98	0-73	11-97	0-78	12
13	12-98	0-68	12-98	0-73	12-98	0-79	12-97	0-85	13
14	13-98	0-73	13-98	0-79	13-97	0-85	13-97	0-92	14
15	14-98	0-79	14-98	0-85	14-97	0-92	14-97	0-98	15
16	15-98	0-84	15-97	0-91	15-97	0-98	15-97	1-05	16
17	16-98	0-89	16-97	0-96	16-97	1-04	16-96	1-11	17
18	17-98	0-94	17-97	1-02	17-97	1-10	17-96	1-18	18
19	18-98	0-99	18-97	1-08	18-96	1-16	18-96	1-24	19
20	19-97	1-05	19-97	1-13	19-96	1-22	19-96	1-31	20
21	20-97	1-10	20-97	1-19	20-96	1-28	20-96	1-37	21
22	21-97	1-15	21-96	1-25	21-96	1-34	21-95	1-44	22
23	22-97	1-20	22-96	1-30	22-96	1-40	22-95	1-50	23
24	23-97	1-26	23-96	1-36	23-96	1-47	23-95	1-57	24
25	24-97	1-31	24-96	1-42	24-95	1-53	24-95	1-64	25
26	25-96	1-36	25-96	1-47	25-95	1-59	25-94	1-70	26
27	26-96	1-41	26-96	1-53	26-95	1-65	26-94	1-77	27
28	27-96	1-47	27-95	1-59	27-95	1-71	27-94	1-83	28
29	28-96	1-52	28-95	1-64	28-95	1-77	28-94	1-90	29
30	29-96	1-57	29-95	1-70	29-94	1-83	29-94	1-96	30
31	30-96	1-62	30-95	1-76	30-94	1-89	30-93	2-03	31
32	31-96	1-67	31-95	1-81	31-94	1-95	31-93	2-09	32
33	32-95	1-73	32-95	1-87	32-94	2-01	32-93	2-16	33
34	33-95	1-78	33-95	1-93	33-94	2-08	33-93	2-22	34
35	34-95	1-83	34-94	1-98	34-93	2-14	34-92	2-29	35
36	35-95	1-88	35-94	2-04	35-93	2-20	35-92	2-35	36
37	36-95	1-94	36-94	2-10	36-93	2-26	36-92	2-42	37
38	37-95	1-99	37-94	2-15	37-93	2-32	37-92	2-49	38
39	38-95	2-04	38-94	2-21	38-93	2-38	38-92	2-55	39
40	39-95	2-09	39-94	2-27	39-93	2-44	39-91	2-62	40
41	40-94	2-15	40-93	2-32	40-92	2-50	40-91	2-68	41
42	41-94	2-20	41-93	2-38	41-92	2-56	41-91	2-75	42
43	42-94	2-25	42-93	2-44	42-92	2-63	42-91	2-81	43
44	43-94	2-30	43-93	2-49	43-92	2-69	43-91	2-88	44
45	44-94	2-36	44-93	2-55	44-92	2-75	44-90	2-94	45
46	45-94	2-41	45-93	2-61	45-91	2-81	45-90	3-01	46
47	46-94	2-46	46-92	2-66	46-91	2-87	46-90	3-07	47
48	47-93	2-51	47-92	2-72	47-91	2-93	47-90	3-14	48
49	48-93	2-56	48-92	2-78	48-91	2-99	48-90	3-20	49
50	49-93	2-62	49-92	2-83	49-91	3-05	49-89	3-27	50
Distance.	87 DEG.		86 $\frac{3}{4}$ DEG.		86 $\frac{1}{2}$ DEG.		86 $\frac{1}{4}$ DEG.		Distance.
	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	

Distance.	3 DEG.		3 $\frac{1}{4}$ DEG.		3 $\frac{1}{2}$ DEG.		3 $\frac{3}{4}$ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	50-93	2-67	50-92	2-89	50-90	3-11	50-89	3-34	51
52	51-93	2-72	51-92	2-95	51-90	3-17	51-89	3-40	52
53	52-93	2-77	52-91	3-00	52-90	3-24	52-89	3-47	53
54	53-93	2-83	53-91	3-06	53-90	3-30	53-88	3-53	54
55	54-92	2-88	54-91	3-12	54-90	3-36	54-88	3-60	55
56	55-92	2-93	55-91	3-17	55-90	3-42	55-88	3-66	56
57	56-92	2-98	56-91	3-23	56-89	3-48	56-88	3-73	57
58	57-92	3-04	57-91	3-29	57-89	3-54	57-88	3-79	58
59	58-92	3-09	58-91	3-34	58-89	3-60	58-87	3-86	59
60	59-92	3-14	59-90	3-40	59-89	3-66	59-87	3-92	60
61	60-92	3-19	60-90	3-46	60-89	3-72	60-87	3-99	61
62	61-92	3-24	61-90	3-51	61-88	3-79	61-87	4-05	62
63	62-91	3-30	62-90	3-57	62-88	3-85	62-87	4-12	63
64	63-91	3-35	63-90	3-63	63-88	3-91	63-86	4-19	64
65	64-91	3-40	64-90	3-69	64-88	3-97	64-86	4-25	65
66	65-91	3-45	65-89	3-74	65-88	4-03	65-86	4-32	66
67	66-91	3-51	66-89	3-80	66-88	4-09	66-86	4-38	67
68	67-91	3-56	67-89	3-86	67-87	4-15	67-85	4-45	68
69	68-91	3-61	68-89	3-91	68-87	4-21	68-85	4-51	69
70	69-90	3-66	69-89	3-97	69-87	4-27	69-85	4-58	70
71	70-90	3-72	70-89	4-03	70-87	4-33	70-85	4-64	71
72	71-90	3-77	71-88	4-08	71-87	4-40	71-85	4-71	72
73	72-90	3-82	72-88	4-14	72-86	4-46	72-84	4-77	73
74	73-90	3-87	73-88	4-20	73-86	4-52	73-84	4-84	74
75	74-90	3-93	74-88	4-25	74-86	4-58	74-84	4-91	75
76	75-90	3-98	75-88	4-31	75-86	4-64	75-84	4-97	76
77	76-89	4-03	76-88	4-37	76-86	4-70	76-84	5-04	77
78	77-89	4-08	77-87	4-42	77-85	4-76	77-83	5-10	78
79	78-89	4-13	78-87	4-48	78-85	4-82	78-83	5-17	79
80	79-89	4-19	79-87	4-54	79-85	4-88	79-83	5-23	80
81	80-89	4-24	80-87	4-59	80-85	4-94	80-83	5-30	81
82	81-89	4-29	81-87	4-65	81-85	5-01	81-82	5-36	82
83	82-89	4-34	82-87	4-71	82-85	5-07	82-82	5-43	83
84	83-88	4-40	83-86	4-76	83-84	5-13	83-82	5-49	84
85	84-88	4-45	84-86	4-82	84-84	5-19	84-82	5-56	85
86	85-88	4-50	85-86	4-88	85-84	5-25	85-82	5-62	86
87	86-88	4-55	86-86	4-93	86-84	5-31	86-81	5-69	87
88	87-88	4-61	87-86	4-99	87-84	5-37	87-81	5-76	88
89	88-88	4-66	88-86	5-05	88-83	5-43	88-81	5-82	89
90	89-88	4-71	89-86	5-10	89-83	5-49	89-81	5-89	90
91	90-88	4-76	90-85	5-16	90-83	5-56	90-81	5-95	91
92	91-87	4-81	91-85	5-22	91-83	5-62	91-80	6-02	92
93	92-87	4-87	92-85	5-27	92-83	5-68	92-80	6-08	93
94	93-87	4-92	93-85	5-33	93-82	5-74	93-80	6-15	94
95	94-87	4-97	94-85	5-39	94-82	5-80	94-80	6-21	95
96	95-87	5-02	95-85	5-44	95-82	5-86	95-79	6-28	96
97	96-87	5-08	96-84	5-50	96-82	5-92	96-79	6-34	97
98	97-87	5-13	97-84	5-56	97-82	5-98	97-79	6-41	98
99	98-86	5-18	98-84	5-61	98-82	6-04	98-79	6-47	99
100	99-86	5-23	99-84	5-67	99-81	6-10	99-79	6-54	100
Distance.	87 DEG.		86 $\frac{1}{4}$ DEG.		86 $\frac{1}{2}$ DEG.		86 $\frac{3}{4}$ DEG.		Distance.
	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	

Distance.	4 DEG.		4½ DEG.		4½ DEG.		4¾ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	1-00	0-07	1-00	0-07	1-00	0-08	1-00	0-08	1
2	2-00	0-14	1-99	0-15	1-99	0-16	1-99	0-17	2
3	2-99	0-21	2-99	0-22	2-99	0-24	2-99	0-25	3
4	3-99	0-28	3-99	0-30	3-99	0-31	3-98	0-33	4
5	4-99	0-35	4-99	0-37	4-98	0-39	4-98	0-41	5
6	5-99	0-42	5-98	0-44	5-98	0-47	5-98	0-50	6
7	6-98	0-49	6-98	0-52	6-98	0-55	6-97	0-58	7
8	7-98	0-56	7-98	0-59	7-98	0-63	7-97	0-66	8
9	8-98	0-63	8-98	0-67	8-97	0-71	8-97	0-75	9
10	9-98	0-70	9-97	0-74	9-97	0-78	9-97	0-83	10
11	10-97	0-77	10-97	0-82	10-97	0-86	10-96	0-91	11
12	11-97	0-84	11-97	0-89	11-96	0-94	11-96	0-99	12
13	12-97	0-91	12-96	0-96	12-96	1-02	12-96	1-08	13
14	13-97	0-98	13-96	1-04	13-96	1-10	13-95	1-16	14
15	14-96	1-05	14-96	1-11	14-95	1-18	14-95	1-24	15
16	15-96	1-12	15-96	1-19	15-95	1-26	15-95	1-32	16
17	16-96	1-19	16-95	1-26	16-95	1-33	16-94	1-41	17
18	17-96	1-26	17-95	1-33	17-94	1-41	17-94	1-49	18
19	18-95	1-33	18-95	1-40	18-94	1-49	18-93	1-57	19
20	19-95	1-40	19-95	1-48	19-94	1-57	19-93	1-66	20
21	20-95	1-46	20-94	1-56	20-94	1-65	20-93	1-74	21
22	21-95	1-53	21-94	1-63	21-93	1-73	21-92	1-82	22
23	22-94	1-60	22-94	1-70	22-93	1-80	22-92	1-90	23
24	23-94	1-67	23-93	1-78	23-92	1-88	23-92	1-99	24
25	24-94	1-74	24-93	1-85	24-92	1-96	24-91	2-07	25
26	25-94	1-81	25-93	1-93	25-92	2-04	25-91	2-15	26
27	26-93	1-88	26-93	2-00	26-92	2-12	26-91	2-24	27
28	27-93	1-95	27-92	2-08	27-91	2-20	27-90	2-32	28
29	28-93	2-02	28-92	2-15	28-91	2-28	28-90	2-40	29
30	29-93	2-09	29-92	2-22	29-91	2-35	29-90	2-48	30
31	30-92	2-16	30-91	2-30	30-90	2-43	30-89	2-57	31
32	31-92	2-23	31-91	2-37	31-90	2-51	31-89	2-65	32
33	32-92	2-30	32-91	2-45	32-90	2-59	32-89	2-73	33
34	33-92	2-37	33-91	2-52	33-90	2-67	33-88	2-82	34
35	34-91	2-44	34-90	2-59	34-89	2-75	34-88	2-90	35
36	35-91	2-51	35-90	2-67	35-89	2-82	35-88	2-98	36
37	36-91	2-58	36-90	2-74	36-89	2-90	36-87	3-06	37
38	37-91	2-65	37-90	2-82	37-88	2-98	37-87	3-15	38
39	38-90	2-72	38-89	2-89	38-88	3-06	38-87	3-23	39
40	39-90	2-79	39-89	2-96	39-88	3-14	39-86	3-31	40
41	40-90	2-86	40-89	3-04	40-87	3-22	40-86	3-40	41
42	41-90	2-93	41-88	3-11	41-87	3-30	41-86	3-48	42
43	42-90	3-00	42-88	3-19	42-87	3-37	42-85	3-56	43
44	43-89	3-07	43-88	3-26	43-86	3-45	43-85	3-64	44
45	44-89	3-14	44-88	3-33	44-86	3-53	44-85	3-73	45
46	45-89	3-21	45-87	3-41	45-86	3-61	45-84	3-81	46
47	46-89	3-28	46-87	3-48	46-86	3-69	46-84	3-89	47
48	47-88	3-35	47-87	3-56	47-85	3-77	47-84	3-97	48
49	48-88	3-42	48-87	3-63	48-85	3-84	48-83	4-06	49
50	49-88	3-49	49-86	3-71	49-85	3-92	49-83	4-14	50
Distance.	86 DEG.		85½ DEG.		85½ DEG.		85¼ DEG.		Distance.
	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	

Distance.	4 DEG.		4½ DEG.		4¾ DEG.		4¾ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	50-88	3-56	50-86	3-78	50-84	4-00	50-82	4-22	51
52	51-87	3-63	51-86	3-85	51-84	4-08	51-82	4-31	52
53	52-87	3-70	52-85	3-93	52-84	4-16	52-82	4-39	53
54	53-87	3-77	53-85	4-00	53-83	4-24	53-81	4-47	54
55	54-87	3-84	54-85	4-08	54-83	4-32	54-81	4-55	55
56	55-86	3-91	55-85	4-15	55-83	4-39	55-81	4-64	56
57	56-86	3-98	56-84	4-22	56-82	4-47	56-80	4-72	57
58	57-86	4-05	57-84	4-30	57-82	4-55	57-80	4-80	58
59	58-86	4-12	58-84	4-37	58-82	4-63	58-80	4-89	59
60	59-85	4-19	59-84	4-45	59-82	4-71	59-79	4-97	60
61	60-85	4-26	60-83	4-52	60-81	4-79	60-79	5-05	61
62	61-85	4-32	61-83	4-59	61-81	4-86	61-79	5-13	62
63	62-85	4-39	62-83	4-67	62-81	4-94	62-78	5-22	63
64	63-84	4-46	63-82	4-74	63-80	5-02	63-78	5-30	64
65	64-84	4-53	64-82	4-82	64-80	5-10	64-78	5-38	65
66	65-84	4-60	65-82	4-89	65-80	5-18	65-77	5-47	66
67	66-84	4-67	66-82	4-97	66-79	5-26	66-77	5-55	67
68	67-83	4-74	67-81	5-04	67-79	5-34	67-77	5-63	68
69	68-83	4-81	68-81	5-11	68-79	5-41	68-76	5-71	69
70	69-83	4-88	69-81	5-19	69-78	5-49	69-76	5-80	70
71	70-83	4-95	70-80	5-26	70-78	5-57	70-76	5-88	71
72	71-82	5-02	71-80	5-34	71-78	5-65	71-75	5-96	72
73	72-82	5-09	72-80	5-41	72-77	5-73	72-75	6-04	73
74	73-82	5-16	73-80	5-48	73-77	5-81	73-75	6-13	74
75	74-82	5-23	74-79	5-56	74-77	5-88	74-74	6-21	75
76	75-81	5-30	75-79	5-63	75-77	5-96	75-74	6-29	76
77	76-81	5-37	76-79	5-71	76-76	6-04	76-74	6-38	77
78	77-81	5-44	77-79	5-78	77-76	6-12	77-73	6-46	78
79	78-81	5-51	78-78	5-85	78-76	6-20	78-73	6-54	79
80	79-81	5-58	79-78	5-93	79-75	6-28	79-73	6-62	80
81	80-80	5-65	80-78	6-00	80-75	6-36	80-72	6-71	81
82	81-80	5-72	81-78	6-08	81-75	6-43	81-72	6-79	82
83	82-80	5-79	82-77	6-15	82-74	6-51	82-71	6-87	83
84	83-80	5-86	83-77	6-23	83-74	6-59	83-71	6-96	84
85	84-79	5-93	84-77	6-30	84-74	6-67	84-71	7-04	85
86	85-79	6-00	85-76	6-37	85-73	6-75	85-70	7-12	86
87	86-79	6-07	86-76	6-45	86-73	6-83	86-70	7-20	87
88	87-79	6-14	87-76	6-52	87-73	6-90	87-70	7-29	88
89	88-78	6-21	88-76	6-60	88-73	6-98	88-70	7-37	89
90	89-78	6-28	89-75	6-67	89-72	7-06	89-69	7-45	90
91	90-78	6-35	90-75	6-74	90-72	7-14	90-69	7-54	91
92	91-78	6-42	91-75	6-82	91-72	7-22	91-68	7-62	92
93	92-77	6-49	92-74	6-89	92-71	7-30	92-68	7-70	93
94	93-77	6-56	93-74	6-97	93-71	7-38	93-68	7-78	94
95	94-77	6-63	94-74	7-04	94-71	7-45	94-67	7-87	95
96	95-77	6-70	95-74	7-11	95-70	7-53	95-67	7-95	96
97	96-76	6-77	96-73	7-19	96-70	7-61	96-67	8-03	97
98	97-76	6-84	97-73	7-26	97-70	7-69	97-66	8-12	98
99	98-76	6-91	98-73	7-34	98-69	7-77	98-66	8-20	99
100	99-76	6-98	99-73	7-41	99-69	7-85	99-66	8-28	100
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	86 DEG.		85¾ DEG.		85½ DEG.		85¼ DEG.		

Distance.	5 DEG.		5 $\frac{1}{2}$ DEG.		5 $\frac{1}{2}$ DEG.		5 $\frac{1}{2}$ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	1-00	0-09	1-00	0-09	1-00	0-10	0-99	0-10	1
2	1-99	0-17	1-99	0-18	1-99	0-19	1-99	0-20	2
3	2-99	0-25	2-99	0-27	2-99	0-29	2-98	0-30	3
4	3-98	0-35	3-98	0-37	3-98	0-38	3-98	0-40	4
5	4-98	0-44	4-98	0-46	4-98	0-48	4-97	0-50	5
6	5-98	0-52	5-97	0-55	5-97	0-58	5-97	0-60	6
7	6-97	0-61	6-97	0-64	6-97	0-67	6-96	0-70	7
8	7-97	0-70	7-97	0-73	7-96	0-76	7-96	0-80	8
9	8-97	0-78	8-96	0-82	8-96	0-86	8-95	0-90	9
10	9-96	0-87	9-96	0-92	9-95	0-96	9-95	1-00	10
11	10-96	0-96	10-95	1-01	10-95	1-05	10-94	1-10	11
12	11-95	1-05	11-95	1-10	11-94	1-15	11-94	1-20	12
13	12-95	1-13	12-95	1-19	12-94	1-25	12-93	1-30	13
14	13-95	1-22	13-94	1-28	13-94	1-34	13-93	1-40	14
15	14-94	1-31	14-94	1-37	14-93	1-44	14-92	1-50	15
16	15-94	1-39	15-93	1-46	15-93	1-53	15-92	1-60	16
17	16-94	1-48	16-93	1-56	16-92	1-63	16-91	1-70	17
18	17-93	1-57	17-92	1-65	17-92	1-73	17-91	1-80	18
19	18-93	1-66	18-92	1-74	18-91	1-82	18-90	1-90	19
20	19-92	1-74	19-92	1-83	19-91	1-92	19-90	2-00	20
21	20-92	1-83	20-91	1-92	20-90	2-01	20-89	2-10	21
22	21-92	1-92	21-91	2-01	21-90	2-11	21-89	2-20	22
23	22-91	2-00	22-90	2-10	22-89	2-20	22-88	2-30	23
24	23-91	2-09	23-90	2-20	23-89	2-30	23-88	2-40	24
25	24-90	2-18	24-90	2-29	24-88	2-40	24-87	2-50	25
26	25-90	2-27	25-89	2-38	25-88	2-49	25-87	2-60	26
27	26-90	2-35	26-89	2-47	26-88	2-59	26-86	2-71	27
28	27-89	2-44	27-88	2-56	27-87	2-68	27-86	2-81	28
29	28-89	2-53	28-88	2-65	28-87	2-78	28-85	2-91	29
30	29-89	2-61	29-87	2-75	29-86	2-88	29-85	3-01	30
31	30-88	2-70	30-87	2-84	30-86	2-97	30-84	3-11	31
32	31-88	2-79	31-87	2-93	31-85	3-07	31-84	3-21	32
33	32-87	2-88	32-86	3-02	32-85	3-16	32-83	3-31	33
34	33-87	2-96	33-86	3-11	33-84	3-26	33-83	3-41	34
35	34-87	3-05	34-85	3-20	34-84	3-35	34-82	3-51	35
36	35-86	3-14	35-85	3-29	35-83	3-45	35-82	3-61	36
37	36-86	3-22	36-84	3-39	36-83	3-55	36-81	3-71	37
38	37-86	3-31	37-84	3-48	37-83	3-64	37-81	3-81	38
39	38-85	3-40	38-84	3-57	38-82	3-74	38-80	3-91	39
40	39-85	3-49	39-83	3-66	39-82	3-83	39-80	4-01	40
41	40-84	3-57	40-83	3-75	40-81	3-93	40-79	4-11	41
42	41-84	3-66	41-82	3-84	41-81	4-03	41-79	4-21	42
43	42-84	3-75	42-82	3-93	42-80	4-12	42-78	4-31	43
44	43-83	3-83	43-82	4-03	43-80	4-22	43-78	4-41	44
45	44-83	3-92	44-81	4-12	44-79	4-31	44-77	4-51	45
46	45-82	4-01	45-81	4-21	45-79	4-41	45-77	4-61	46
47	46-82	4-10	46-80	4-30	46-78	4-50	46-76	4-71	47
48	47-82	4-18	47-80	4-39	47-78	4-60	47-76	4-81	48
49	48-81	4-27	48-79	4-48	48-77	4-70	48-75	4-91	49
50	49-81	4-36	49-79	4-58	49-77	4-79	49-75	5-01	50
Distance.	85 DEG.		84 $\frac{1}{2}$ DEG.		84 $\frac{1}{2}$ DEG.		84 $\frac{1}{2}$ DEG.		Distance.
	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	

Distance.	5 DEG.		5 $\frac{1}{4}$ DEG.		5 $\frac{1}{2}$ DEG.		5 $\frac{3}{4}$ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	50-81	4-44	50-79	4-67	50-77	4-89	50-74	5-11	51
52	51-80	4-53	51-78	4-76	51-76	4-98	51-74	5-21	52
53	52-80	4-62	52-78	4-85	52-76	5-08	52-73	5-31	53
54	53-79	4-71	53-77	4-94	53-75	5-18	53-73	5-41	54
55	54-79	4-79	54-77	5-03	54-75	5-27	54-72	5-51	55
56	55-79	4-88	55-77	5-12	55-74	5-37	55-72	5-61	56
57	56-78	4-97	56-76	5-22	56-74	5-46	56-71	5-71	57
58	57-78	5-06	57-76	5-31	57-73	5-56	57-71	5-81	58
59	58-78	5-14	58-75	5-40	58-73	5-65	58-70	5-91	59
60	59-77	5-23	59-75	5-49	59-72	5-75	59-70	6-01	60
61	60-77	5-32	60-74	5-58	60-72	5-85	60-69	6-11	61
62	61-76	5-40	61-74	5-67	61-71	5-94	61-69	6-21	62
63	62-76	5-49	62-74	5-76	62-71	6-04	62-68	6-31	63
64	63-76	5-58	63-73	5-86	63-71	6-13	63-68	6-41	64
65	64-75	5-67	64-73	5-95	64-70	6-23	64-67	6-51	65
66	65-75	5-75	65-72	6-04	65-70	6-33	65-67	6-61	66
67	66-75	5-84	66-72	6-13	66-69	6-42	66-66	6-71	67
68	67-74	5-93	67-71	6-22	67-69	6-52	67-66	6-81	68
69	68-74	6-01	68-71	6-31	68-68	6-61	68-65	6-91	69
70	69-73	6-10	69-71	6-41	69-68	6-71	69-65	7-01	70
71	70-73	6-19	70-70	6-50	70-67	6-81	70-64	7-11	71
72	71-73	6-28	71-70	6-59	71-67	6-90	71-64	7-21	72
73	72-72	6-36	72-69	6-68	72-66	7-00	72-63	7-31	73
74	73-72	6-45	73-69	6-77	73-66	7-09	73-63	7-41	74
75	74-71	6-54	74-69	6-86	74-65	7-19	74-62	7-51	75
76	75-71	6-62	75-68	6-95	75-65	7-28	75-62	7-61	76
77	76-71	6-71	76-68	7-05	76-65	7-38	76-61	7-71	77
78	77-70	6-80	77-67	7-14	77-64	7-48	77-61	7-81	78
79	78-70	6-89	78-67	7-23	78-64	7-57	78-60	7-91	79
80	79-70	6-97	79-66	7-32	79-63	7-67	79-60	8-02	80
81	80-69	7-06	80-66	7-41	80-63	7-76	80-59	8-12	81
82	81-69	7-15	81-66	7-50	81-62	7-86	81-59	8-22	82
83	82-68	7-23	82-65	7-59	82-62	7-96	82-58	8-32	83
84	83-68	7-32	83-65	7-69	83-61	8-05	83-58	8-42	84
85	84-68	7-41	84-64	7-78	84-61	8-15	84-57	8-52	85
86	85-67	7-50	85-64	7-87	85-60	8-24	85-57	8-62	86
87	86-67	7-58	86-64	7-96	86-60	8-34	86-56	8-72	87
88	87-67	7-67	87-63	8-05	87-59	8-43	87-56	8-82	88
89	88-66	7-76	88-63	8-14	88-59	8-53	88-55	8-92	89
90	89-66	7-84	89-62	8-24	89-59	8-63	89-55	9-02	90
91	90-65	7-93	90-62	8-33	90-58	8-72	90-54	9-12	91
92	91-65	8-02	91-61	8-42	91-58	8-82	91-54	9-22	92
93	92-65	8-11	92-61	8-51	92-57	8-91	92-53	9-32	93
94	93-64	8-19	93-61	8-60	93-57	9-01	93-53	9-42	94
95	94-64	8-28	94-60	8-69	94-56	9-11	94-52	9-52	95
96	95-63	8-37	95-60	8-78	95-56	9-20	95-52	9-62	96
97	96-63	8-45	96-59	8-88	96-55	9-30	96-51	9-72	97
98	97-63	8-54	97-59	8-97	97-55	9-39	97-51	9-82	98
99	98-62	8-63	98-59	9-06	98-54	9-49	98-50	9-92	99
100	99-62	8-72	99-58	9-15	99-54	9-58	99-50	10-02	100
Distance.	85 DEG.		84 $\frac{3}{4}$ DEG.		84 $\frac{1}{2}$ DEG.		84 $\frac{1}{4}$ DEG.		Distance.
	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	

TRAVERSE TABLE.

Distance.	6 DEG.		6 $\frac{1}{4}$ DEG.		6 $\frac{1}{2}$ DEG.		6 $\frac{3}{4}$ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	0-99	0-10	0-99	0-11	0-99	0-11	0-99	0-12	1
2	1-99	0-21	1-99	0-22	1-99	0-23	1-99	0-24	2
3	2-98	0-31	2-98	0-33	2-98	0-34	2-98	0-35	3
4	3-98	0-41	3-98	0-44	3-97	0-45	3-97	0-47	4
5	4-97	0-52	4-97	0-54	4-97	0-57	4-97	0-59	5
6	5-97	0-63	5-96	0-65	5-96	0-68	5-96	0-71	6
7	6-96	0-73	6-96	0-76	6-96	0-79	6-95	0-82	7
8	7-96	0-84	7-95	0-87	7-95	0-91	7-94	0-94	8
9	8-95	0-94	8-95	0-98	8-94	1-02	8-94	1-06	9
10	9-95	1-05	9-94	1-09	9-94	1-13	9-93	1-18	10
11	10-94	1-15	10-93	1-20	10-93	1-25	10-92	1-29	11
12	11-93	1-25	11-93	1-31	11-92	1-36	11-92	1-41	12
13	12-93	1-36	12-92	1-42	12-92	1-47	12-91	1-53	13
14	13-92	1-46	13-92	1-52	13-91	1-59	13-90	1-65	14
15	14-92	1-57	14-91	1-63	14-90	1-70	14-90	1-76	15
16	15-91	1-67	15-90	1-74	15-90	1-81	15-89	1-88	16
17	16-91	1-78	16-90	1-85	16-89	1-92	16-88	2-00	17
18	17-90	1-88	17-89	1-96	17-88	2-04	17-88	2-12	18
19	18-90	1-99	18-89	2-07	18-88	2-15	18-87	2-23	19
20	19-89	2-09	19-88	2-18	19-87	2-26	19-86	2-35	20
21	20-88	2-20	20-88	2-29	20-87	2-38	20-85	2-47	21
22	21-88	2-30	21-87	2-40	21-86	2-49	21-85	2-59	22
23	22-87	2-40	22-86	2-50	22-85	2-60	22-84	2-70	23
24	23-87	2-51	23-86	2-61	23-85	2-72	23-83	2-82	24
25	24-86	2-61	24-85	2-72	24-84	2-83	24-83	2-94	25
26	25-86	2-72	25-85	2-83	25-83	2-94	25-82	3-06	26
27	26-85	2-82	26-84	2-94	26-83	3-06	26-81	3-17	27
28	27-85	2-93	27-83	3-05	27-82	3-17	27-81	3-29	28
29	28-84	3-03	28-83	3-16	28-81	3-28	28-80	3-41	29
30	29-84	3-14	29-82	3-27	29-81	3-40	29-79	3-53	30
31	30-83	3-24	30-82	3-37	30-80	3-51	30-79	3-64	31
32	31-82	3-34	31-81	3-48	31-79	3-62	31-78	3-76	32
33	32-82	3-45	32-80	3-59	32-79	3-74	32-77	3-88	33
34	33-81	3-55	33-80	3-70	33-78	3-85	33-76	4-00	34
35	34-81	3-66	34-79	3-81	34-78	3-96	34-76	4-11	35
36	35-80	3-76	35-79	3-92	35-77	4-08	35-75	4-23	36
37	36-80	3-87	36-78	4-03	36-76	4-19	36-75	4-35	37
38	37-79	3-97	37-77	4-14	37-76	4-30	37-74	4-47	38
39	38-79	4-08	38-77	4-25	38-75	4-41	38-73	4-58	39
40	39-78	4-18	39-76	4-35	39-74	4-53	39-72	4-70	40
41	40-78	4-29	40-76	4-46	40-74	4-64	40-72	4-82	41
42	41-77	4-39	41-75	4-57	41-73	4-76	41-71	4-94	42
43	42-76	4-49	42-74	4-68	42-72	4-87	42-70	5-05	43
44	43-76	4-60	43-74	4-79	43-72	4-98	43-70	5-17	44
45	44-75	4-70	44-73	4-90	44-71	5-09	44-69	5-29	45
46	45-75	4-81	45-73	5-01	45-70	5-21	45-68	5-41	46
47	46-74	4-91	46-72	5-12	46-70	5-32	46-67	5-52	47
48	47-74	5-02	47-71	5-23	47-69	5-43	47-67	5-64	48
49	48-73	5-12	48-71	5-34	48-69	5-55	48-66	5-76	49
50	49-73	5-23	49-70	5-44	49-68	5-66	49-65	5-88	50
Distance.	84 DEG.		83 $\frac{1}{4}$ DEG.		83 $\frac{1}{2}$ DEG.		83 $\frac{3}{4}$ DEG.		Distance.
	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	

Distance.	6 DEG.		6¼ DEG.		6½ DEG.		6¾ DEG.		Distance.	
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.		
51	50-72	5-33	50-70	5-55	50-67	5-77	50-65	5-99	51	
52	51-72	5-44	51-69	5-66	51-67	5-89	51-64	6-11	52	
53	52-71	5-54	52-68	5-77	52-66	6-00	52-63	6-23	53	
54	53-70	5-64	53-68	5-88	53-65	6-11	53-63	6-35	54	
55	54-70	5-75	54-67	5-99	54-65	6-23	54-62	6-46	55	
56	55-69	5-85	55-67	6-10	55-64	6-34	55-61	6-58	56	
57	56-69	5-96	56-66	6-21	56-63	6-45	56-60	6-70	57	
58	57-68	6-06	57-66	6-31	57-63	6-57	57-60	6-82	58	
59	58-68	6-17	58-65	6-42	58-62	6-68	58-59	6-93	59	
60	59-67	6-27	59-64	6-53	59-61	6-79	59-58	7-05	60	
61	60-67	6-38	60-64	6-64	60-61	6-91	60-58	7-17	61	
62	61-66	6-48	61-63	6-75	61-60	7-02	61-57	7-29	62	
63	62-65	6-59	62-63	6-86	62-60	7-13	62-56	7-40	63	
64	63-65	6-69	63-62	6-97	63-59	7-25	63-56	7-52	64	
65	64-64	6-79	64-61	7-08	64-58	7-36	64-55	7-64	65	
66	65-64	6-90	65-61	7-19	65-58	7-47	65-54	7-76	66	
67	66-63	7-00	66-60	7-29	66-57	7-58	66-54	7-88	67	
68	67-63	7-11	67-60	7-40	67-56	7-70	67-53	7-99	68	
69	68-62	7-21	68-59	7-51	68-56	7-81	68-52	8-11	69	
70	69-62	7-32	69-58	7-62	69-55	7-92	69-51	8-23	70	
71	70-61	7-42	70-58	7-73	70-54	8-04	70-51	8-35	71	
72	71-61	7-53	71-57	7-84	71-54	8-15	71-50	8-46	72	
73	72-60	7-63	72-57	7-95	72-53	8-26	72-49	8-58	73	
74	73-59	7-74	73-56	8-06	73-52	8-38	73-49	8-70	74	
75	74-59	7-84	74-55	8-17	74-52	8-49	74-48	8-82	75	
76	75-58	7-94	75-55	8-27	75-51	8-60	75-47	8-93	76	
77	76-58	8-05	76-54	8-38	76-51	8-72	76-47	9-05	77	
78	77-57	8-15	77-54	8-49	77-50	8-83	77-46	9-17	78	
79	78-57	8-26	78-53	8-60	78-49	8-94	78-45	9-29	79	
80	79-56	8-36	79-53	8-71	79-49	9-06	79-45	9-40	80	
81	80-56	8-47	80-52	8-82	80-48	9-17	80-44	9-52	81	
82	81-55	8-57	81-51	8-93	81-47	9-28	81-43	9-64	82	
83	82-55	8-68	82-51	9-04	82-47	9-40	82-42	9-76	83	
84	83-54	8-78	83-50	9-14	83-46	9-51	83-42	9-87	84	
85	84-53	8-88	84-50	9-25	84-45	9-62	84-41	9-99	85	
86	85-53	8-99	85-49	9-36	85-45	9-74	85-40	10-11	86	
87	86-52	9-09	86-48	9-47	86-44	9-85	86-40	10-23	87	
88	87-52	9-20	87-48	9-58	87-43	9-96	87-39	10-34	88	
89	88-51	9-30	88-47	9-69	88-43	10-08	88-38	10-46	89	
90	89-51	9-41	89-47	9-80	89-42	10-19	89-38	10-58	90	
91	90-50	9-51	90-46	9-91	90-42	10-30	90-37	10-70	91	
92	91-50	9-62	91-45	10-02	91-41	10-41	91-36	10-81	92	
93	92-49	9-72	92-45	10-12	92-40	10-53	92-36	10-93	93	
94	93-49	9-83	93-44	10-23	93-40	10-64	93-35	11-05	94	
95	94-48	9-93	94-44	10-34	94-39	10-75	94-34	11-17	95	
96	95-47	10-03	95-43	10-45	95-38	10-87	95-33	11-28	96	
97	96-47	10-14	96-42	10-56	96-38	10-98	96-33	11-40	97	
98	97-46	10-24	97-42	10-67	97-37	11-09	97-32	11-52	98	
99	98-46	10-35	98-41	10-78	98-36	11-21	98-31	11-64	99	
100	99-45	10-45	99-41	10-89	99-36	11-32	99-31	11-75	100	
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.	
		84 DEG.		83¾ DEG.		83½ DEG.		83¼ DEG.		

Distance.	7 DEG.		7 $\frac{1}{2}$ DEG.		7 $\frac{1}{2}$ DEG.		7 $\frac{3}{4}$ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	0-99	0-12	0-99	0-13	0-99	0-13	0-99	0-13	1
2	1-99	0-24	1-98	0-25	1-98	0-26	1-98	0-27	2
3	2-98	0-37	2-98	0-38	2-97	0-39	2-97	0-40	3
4	3-97	0-49	3-97	0-50	3-97	0-52	3-96	0-54	4
5	4-96	0-61	4-96	0-63	4-96	0-65	4-95	0-67	5
6	5-96	0-73	5-95	0-76	5-95	0-78	5-95	0-81	6
7	6-95	0-85	6-94	0-88	6-94	0-91	6-94	0-94	7
8	7-94	0-97	7-94	1-01	7-93	1-04	7-93	1-08	8
9	8-93	1-10	8-93	1-14	8-92	1-17	8-92	1-21	9
10	9-93	1-22	9-92	1-26	9-91	1-31	9-91	1-35	10
11	10-92	1-34	10-91	1-39	10-91	1-44	10-90	1-48	11
12	11-91	1-46	11-90	1-51	11-90	1-57	11-89	1-62	12
13	12-90	1-58	12-90	1-64	12-89	1-70	12-88	1-75	13
14	13-90	1-71	13-89	1-77	13-88	1-83	13-87	1-89	14
15	14-89	1-83	14-88	1-89	14-87	1-96	14-86	2-02	15
16	15-88	1-95	15-87	2-02	15-86	2-09	15-85	2-16	16
17	16-87	2-07	16-86	2-15	16-85	2-22	16-84	2-29	17
18	17-87	2-19	17-86	2-27	17-85	2-35	17-84	2-43	18
19	18-86	2-32	18-85	2-40	18-84	2-48	18-83	2-56	19
20	19-85	2-44	19-84	2-52	19-83	2-61	19-82	2-70	20
21	20-84	2-56	20-83	2-65	20-82	2-74	20-81	2-83	21
22	21-84	2-68	21-82	2-78	21-81	2-87	21-80	2-97	22
23	22-83	2-80	22-82	2-90	22-80	3-00	22-79	3-10	23
24	23-82	2-92	23-81	3-03	23-79	3-13	23-78	3-24	24
25	24-81	3-05	24-80	3-15	24-79	3-26	24-77	3-37	25
26	25-81	3-17	25-79	3-28	25-78	3-39	25-76	3-51	26
27	26-80	3-29	26-78	3-41	26-77	3-52	26-75	3-64	27
28	27-79	3-41	27-78	3-53	27-76	3-65	27-74	3-78	28
29	28-78	3-53	28-77	3-66	28-75	3-79	28-74	3-91	29
30	29-78	3-66	29-76	3-79	29-74	3-92	29-73	4-05	30
31	30-77	3-78	30-75	3-91	30-73	4-05	30-72	4-18	31
32	31-76	3-90	31-74	4-04	31-73	4-18	31-71	4-32	32
33	32-75	4-02	32-74	4-16	32-72	4-31	32-70	4-45	33
34	33-75	4-14	33-73	4-29	33-71	4-44	33-69	4-58	34
35	34-74	4-27	34-72	4-42	34-70	4-57	34-68	4-72	35
36	35-73	4-39	35-71	4-54	35-69	4-70	35-67	4-85	36
37	36-72	4-51	36-70	4-67	36-68	4-83	36-66	4-99	37
38	37-72	4-63	37-70	4-80	37-67	4-96	37-65	5-12	38
39	38-71	4-75	38-69	4-92	38-67	5-09	38-64	5-26	39
40	39-70	4-87	39-68	5-05	39-66	5-22	39-63	5-39	40
41	40-70	5-00	40-67	5-17	40-65	5-35	40-63	5-53	41
42	41-69	5-12	41-66	5-30	41-64	5-48	41-62	5-66	42
43	42-68	5-24	42-66	5-43	42-63	5-61	42-61	5-80	43
44	43-67	5-36	43-65	5-55	43-62	5-74	43-60	5-93	44
45	44-67	5-48	44-64	5-68	44-62	5-87	44-59	6-07	45
46	45-66	5-61	45-63	5-81	45-61	6-00	45-58	6-20	46
47	46-65	5-73	46-62	5-93	46-60	6-13	46-57	6-34	47
48	47-64	5-85	47-62	6-06	47-59	6-27	47-56	6-47	48
49	48-63	5-97	48-61	6-18	48-58	6-40	48-55	6-61	49
50	49-63	6-09	49-60	6-31	49-57	6-53	49-54	6-74	50
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	83 DEG.		82 $\frac{3}{4}$ DEG.		82 $\frac{1}{2}$ DEG.		82 $\frac{1}{4}$ DEG.		

Distance.	7 DEG.		7¼ DEG.		7½ DEG.		7¾ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	50-62	6-22	50-59	6-44	50-56	6-66	50-53	6-88	51
52	51-61	6-34	51-58	6-56	51-56	6-79	51-53	7-01	52
53	52-60	6-46	52-58	6-69	52-55	6-92	52-52	7-15	53
54	53-60	6-58	53-57	6-81	53-54	7-05	53-51	7-28	54
55	54-59	6-70	54-56	6-94	54-53	7-18	54-50	7-42	55
56	55-58	6-82	55-55	7-07	55-52	7-31	55-49	7-55	56
57	56-58	6-95	56-54	7-19	56-51	7-44	56-48	7-69	57
58	57-57	7-07	57-54	7-32	57-50	7-57	57-47	7-82	58
59	58-56	7-19	58-53	7-45	58-50	7-70	58-46	7-96	59
60	59-55	7-31	59-52	7-57	59-49	7-83	59-45	8-09	60
61	60-55	7-43	60-51	7-70	60-48	7-96	60-44	8-23	61
62	61-54	7-56	61-50	7-82	61-47	8-09	61-43	8-36	62
63	62-53	7-68	62-50	7-95	62-46	8-22	62-42	8-50	63
64	63-52	7-80	63-49	8-08	63-45	8-35	63-42	8-63	64
65	64-52	7-92	64-48	8-20	64-44	8-48	64-41	8-77	65
66	65-51	8-04	65-47	8-33	65-44	8-61	65-40	8-90	66
67	66-50	8-17	66-46	8-46	66-43	8-75	66-39	9-04	67
68	67-49	8-29	67-46	8-58	67-42	8-88	67-38	9-17	68
69	68-49	8-41	68-45	8-71	68-41	9-01	68-37	9-30	69
70	69-48	8-53	69-44	8-83	69-40	9-14	69-36	9-44	70
71	70-47	8-65	70-43	8-96	70-39	9-27	70-35	9-57	71
72	71-46	8-77	71-42	9-09	71-38	9-40	71-34	9-71	72
73	72-46	8-90	72-42	9-21	72-38	9-53	72-33	9-84	73
74	73-45	9-02	73-41	9-34	73-37	9-66	73-32	9-98	74
75	74-44	9-14	74-40	9-46	74-36	9-79	74-31	10-11	75
76	75-43	9-26	75-39	9-59	75-35	9-92	75-31	10-25	76
77	76-43	9-38	76-38	9-72	76-34	10-05	76-30	10-38	77
78	77-42	9-51	77-38	9-84	77-33	10-18	77-29	10-52	78
79	78-41	9-63	78-37	9-97	78-32	10-31	78-28	10-65	79
80	79-40	9-75	79-36	10-10	79-32	10-44	79-27	10-79	80
81	80-40	9-87	80-35	10-22	80-31	10-57	80-26	10-92	81
82	81-39	9-99	81-34	10-35	81-30	10-70	81-25	11-06	82
83	82-38	10-12	82-34	10-47	82-29	10-83	82-24	11-19	83
84	83-37	10-24	83-33	10-60	83-28	10-96	83-23	11-33	84
85	84-37	10-36	84-32	10-73	84-27	11-09	84-22	11-46	85
86	85-36	10-48	85-31	10-85	85-26	11-23	85-21	11-60	86
87	86-35	10-60	86-30	10-98	86-26	11-36	86-21	11-73	87
88	87-34	10-72	87-30	11-11	87-25	11-49	87-20	11-87	88
89	88-34	10-85	88-29	11-23	88-24	11-62	88-19	12-00	89
90	89-33	10-97	89-28	11-36	89-23	11-75	89-18	12-14	90
91	90-32	11-09	90-27	11-48	90-22	11-88	90-17	12-27	91
92	91-31	11-21	91-26	11-61	91-21	12-01	91-16	12-41	92
93	92-31	11-33	92-26	11-74	92-20	12-14	92-15	12-54	93
94	93-30	11-46	93-25	11-86	93-20	12-27	93-14	12-68	94
95	94-29	11-58	94-24	11-99	94-19	12-40	94-13	12-81	95
96	95-28	11-70	95-23	12-12	95-18	12-53	95-12	12-95	96
97	96-28	11-82	96-22	12-24	96-17	12-66	96-11	13-08	97
98	97-27	11-94	97-22	12-37	97-16	12-79	97-10	13-22	98
99	98-26	12-07	98-21	12-49	98-15	12-92	98-10	13-35	99
100	99-25	12-19	99-20	12-62	99-14	13-05	99-09	13-49	100
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	83 DEG.		82¼ DEG.		82½ DEG.		82¾ DEG.		

Distance.	8 DEG.		8¼ DEG.		8½ DEG.		8¾ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	0-99	0-14	0-99	0-14	0-99	0-15	0-99	0-15	1
2	1-98	0-28	1-98	0-29	1-98	0-30	1-98	0-30	2
3	2-97	0-42	2-97	0-43	2-97	0-44	2-97	0-46	3
4	3-96	0-56	3-96	0-57	3-96	0-59	3-95	0-61	4
5	4-95	0-70	4-95	0-72	4-95	0-74	4-94	0-76	5
6	5-94	0-84	5-94	0-86	5-93	0-89	5-93	0-91	6
7	6-93	0-97	6-93	1-00	6-92	1-03	6-92	1-06	7
8	7-92	1-11	7-92	1-15	7-91	1-18	7-91	1-22	8
9	8-91	1-25	8-91	1-29	8-90	1-33	8-90	1-37	9
10	9-90	1-39	9-90	1-43	9-89	1-48	9-88	1-52	10
11	10-89	1-53	10-89	1-58	10-88	1-63	10-87	1-67	11
12	11-88	1-67	11-88	1-72	11-87	1-77	11-86	1-83	12
13	12-87	1-81	12-87	1-87	12-86	1-92	12-85	1-98	13
14	13-86	1-95	13-86	2-01	13-85	2-07	13-84	2-13	14
15	14-85	2-09	14-85	2-15	14-84	2-22	14-83	2-28	15
16	15-84	2-23	15-84	2-30	15-82	2-36	15-81	2-43	16
17	16-83	2-37	16-83	2-44	16-81	2-51	16-80	2-59	17
18	17-82	2-51	17-81	2-58	17-80	2-66	17-79	2-74	18
19	18-82	2-64	18-80	2-73	18-79	2-81	18-78	2-89	19
20	19-81	2-78	19-79	2-87	19-78	2-96	19-77	2-04	20
21	20-80	2-92	20-78	3-01	20-77	3-10	20-76	3-19	21
22	21-79	3-06	21-77	3-16	21-76	3-25	21-74	3-35	22
23	22-78	3-20	22-76	3-30	22-75	3-40	22-73	3-50	23
24	23-77	3-34	23-75	3-44	23-74	3-55	23-72	3-65	24
25	24-76	3-48	24-74	3-59	24-73	3-70	24-71	3-80	25
26	25-75	3-62	25-73	3-73	25-71	3-84	25-70	3-96	26
27	26-74	3-76	26-72	3-87	26-70	3-99	26-69	4-11	27
28	27-73	3-90	27-71	4-02	27-69	4-14	27-67	4-26	28
29	28-72	4-04	28-70	4-16	28-68	4-29	28-66	4-41	29
30	29-71	4-18	29-69	4-30	29-67	4-43	29-65	4-56	30
31	30-70	4-31	30-68	4-45	30-66	4-58	30-64	4-72	31
32	31-69	4-45	31-67	4-59	31-65	4-73	31-63	4-87	32
33	32-68	4-59	32-66	4-74	32-64	4-88	32-62	5-02	33
34	33-67	4-73	33-65	4-88	33-63	5-03	33-60	5-17	34
35	34-66	4-87	34-64	5-02	34-62	5-17	34-59	5-32	35
36	35-65	5-01	35-63	5-17	35-60	5-32	35-58	5-48	36
37	36-64	5-15	36-62	5-31	36-59	5-47	36-57	5-63	37
38	37-63	5-29	37-61	5-45	37-58	5-62	37-56	5-78	38
39	38-62	5-43	38-60	5-60	38-57	5-76	38-55	5-93	39
40	39-61	5-57	39-59	5-74	39-56	5-91	39-53	6-08	40
41	40-60	5-71	40-58	5-88	40-55	6-06	40-52	6-24	41
42	41-59	5-85	41-57	6-03	41-54	6-21	41-51	6-39	42
43	42-58	5-98	42-56	6-17	42-53	6-36	42-50	6-54	43
44	43-57	6-12	43-54	6-31	43-52	6-50	43-49	6-69	44
45	44-56	6-26	44-53	6-46	44-51	6-65	44-48	6-85	45
46	45-55	6-40	45-52	6-60	45-49	6-80	45-46	7-00	46
47	46-54	6-54	46-51	6-74	46-48	6-95	46-45	7-15	47
48	47-53	6-68	47-50	6-89	47-47	7-09	47-44	7-30	48
49	48-52	6-82	48-49	7-03	48-46	7-24	48-43	7-45	49
50	49-51	6-96	49-48	7-17	49-45	7-39	49-42	7-61	50
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	82 DEG.		81¾ DEG.		81½ DEG.		81¼ DEG.		

Distance.	8 DEG.		8½ DEG.		8½ DEG.		8½ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	50:50	7:10	50:47	7:32	50:44	7:54	50:41	7:76	51
52	51:49	7:24	51:46	7:46	51:43	7:69	51:39	7:91	52
53	52:48	7:38	52:45	7:61	52:42	7:83	52:38	8:06	53
54	53:47	7:52	53:44	7:75	53:41	7:98	53:37	8:21	54
55	54:46	7:65	54:43	7:89	54:40	8:13	54:36	8:37	55
56	55:46	7:79	55:42	8:04	55:38	8:28	55:35	8:52	56
57	56:45	7:93	56:41	8:18	56:37	8:43	56:34	8:67	57
58	57:44	8:07	57:40	8:32	57:36	8:57	57:32	8:82	58
59	58:43	8:21	58:39	8:47	58:35	8:72	58:31	8:98	59
60	59:42	8:35	59:38	8:61	59:34	8:87	59:30	9:13	60
61	60:41	8:49	60:37	8:75	60:33	9:02	60:29	9:28	61
62	61:40	8:63	61:36	8:90	61:32	9:16	61:28	9:43	62
63	62:39	8:77	62:35	9:04	62:31	9:31	62:27	9:58	63
64	63:38	8:91	63:34	9:18	63:30	9:46	63:26	9:74	64
65	64:37	9:05	64:33	9:33	64:29	9:61	64:24	9:89	65
66	65:36	9:19	65:32	9:47	65:28	9:76	65:23	10:04	66
67	66:35	9:32	66:31	9:61	66:26	9:90	66:22	10:19	67
68	67:34	9:46	67:30	9:76	67:25	10:05	67:21	10:34	68
69	68:33	9:60	68:29	9:90	68:24	10:20	68:20	10:50	69
70	69:32	9:74	69:28	10:04	69:23	10:35	69:19	10:65	70
71	70:31	9:88	70:27	10:19	70:22	10:49	70:17	10:80	71
72	71:30	10:02	71:25	10:33	71:21	10:64	71:16	10:95	72
73	72:29	10:16	72:24	10:47	72:20	10:79	72:15	11:10	73
74	73:28	10:30	73:23	10:62	73:19	10:94	73:14	11:26	74
75	74:27	10:44	74:22	10:76	74:18	11:09	74:13	11:41	75
76	75:26	10:58	75:21	10:91	75:17	11:23	75:12	11:56	76
77	76:25	10:72	76:20	11:05	76:15	11:38	76:10	11:71	77
78	77:24	10:86	77:19	11:19	77:14	11:53	77:09	11:87	78
79	78:23	10:99	78:18	11:34	78:13	11:68	78:08	12:02	79
80	79:22	11:13	79:17	11:48	79:12	11:82	79:07	12:17	80
81	80:21	11:27	80:16	11:62	80:11	11:97	80:06	12:32	81
82	81:20	11:41	81:15	11:77	81:10	12:12	81:05	12:47	82
83	82:19	11:55	82:14	11:91	82:09	12:27	82:03	12:63	83
84	83:18	11:69	83:13	12:05	83:08	12:42	83:02	12:78	84
85	84:17	11:83	84:12	12:20	84:07	12:56	84:01	12:93	85
86	85:16	11:97	85:11	12:34	85:06	12:71	85:00	13:08	86
87	86:15	12:11	86:10	12:48	86:04	12:86	85:59	13:23	87
88	87:14	12:25	87:09	12:63	87:03	13:01	86:98	13:39	88
89	88:13	12:39	88:08	12:77	88:02	13:16	87:96	13:54	89
90	89:12	12:53	89:07	12:91	89:01	13:30	88:95	13:69	90
91	90:11	12:66	90:06	13:06	90:00	13:45	89:94	13:84	91
92	91:10	12:80	91:05	13:20	90:99	13:60	90:93	14:00	92
93	92:09	12:94	92:04	13:34	91:98	13:75	91:92	14:15	93
94	93:09	13:08	93:03	13:49	92:97	13:89	92:91	14:30	94
95	94:08	13:22	94:02	13:63	93:96	14:04	93:89	14:45	95
96	95:07	13:36	95:01	13:78	94:95	14:19	94:88	14:60	96
97	96:06	13:50	96:00	13:92	95:93	14:34	95:87	14:76	97
98	97:05	13:64	96:99	14:06	96:92	14:49	96:86	14:91	98
99	98:04	13:78	97:98	14:21	97:91	14:63	97:85	15:06	99
100	99:03	13:92	98:97	14:35	98:90	14:78	98:84	15:21	100
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	82 DEG.		81½ DEG.		81½ DEG.		81½ DEG.		

Distance.	9 DEG.		9½ DEG.		9½ DEG.		9¾ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	0-99	0-16	0-99	0-16	0-99	0-17	0-99	0-17	1
2	1-98	0-31	1-97	0-32	1-97	0-33	1-97	0-34	2
3	2-96	0-47	2-96	0-48	2-96	0-50	2-96	0-51	3
4	3-95	0-63	3-95	0-64	3-95	0-66	3-94	0-68	4
5	4-94	0-78	4-93	0-80	4-93	0-83	4-93	0-85	5
6	5-93	0-94	5-92	0-96	5-92	0-99	5-91	1-02	6
7	6-91	1-10	6-91	1-13	6-90	1-16	6-90	1-19	7
8	7-90	1-25	7-90	1-29	7-89	1-32	7-88	1-35	8
9	8-89	1-41	8-88	1-45	8-88	1-49	8-87	1-52	9
10	9-88	1-56	9-87	1-61	9-86	1-65	9-86	1-69	10
11	10-86	1-72	10-86	1-77	10-85	1-82	10-84	1-86	11
12	11-85	1-88	11-84	1-93	11-84	1-98	11-83	2-03	12
13	12-84	2-03	12-83	2-09	12-82	2-15	12-81	2-20	13
14	13-83	2-19	13-82	2-25	13-81	2-31	13-80	2-37	14
15	14-82	2-35	14-80	2-41	14-79	2-48	14-78	2-54	15
16	15-80	2-50	15-79	2-57	15-78	2-64	15-77	2-71	16
17	16-79	2-66	16-78	2-73	16-77	2-81	16-75	2-88	17
18	17-78	2-82	17-77	2-89	17-75	2-97	17-74	3-05	18
19	18-77	2-97	18-75	3-05	18-74	3-14	18-73	3-22	19
20	19-75	3-13	19-74	3-21	19-73	3-30	19-71	3-39	20
21	20-74	3-29	20-73	3-38	20-71	3-47	20-70	3-56	21
22	21-73	3-44	21-71	3-54	21-70	3-63	21-68	3-73	22
23	22-72	3-60	22-70	3-70	22-68	3-80	22-67	3-90	23
24	23-70	3-75	23-69	3-86	23-67	3-96	23-65	4-06	24
25	24-69	3-91	24-67	4-02	24-66	4-13	24-64	4-23	25
26	25-68	4-07	25-66	4-18	25-64	4-29	25-62	4-40	26
27	26-67	4-22	26-65	4-34	26-63	4-46	26-61	4-57	27
28	27-66	4-38	27-64	4-50	27-62	4-62	27-60	4-74	28
29	28-64	4-54	28-62	4-66	28-60	4-79	28-58	4-91	29
30	29-63	4-69	29-61	4-82	29-59	4-95	29-57	5-08	30
31	30-62	4-85	30-60	4-98	30-57	5-12	30-55	5-25	31
32	31-61	5-01	31-58	5-14	31-56	5-28	31-54	5-42	32
33	32-59	5-16	32-57	5-30	32-55	5-45	32-52	5-59	33
34	33-58	5-32	33-56	5-47	33-53	5-61	33-51	5-76	34
35	34-57	5-48	34-54	5-63	34-52	5-78	34-49	5-93	35
36	35-56	5-63	35-53	5-79	35-51	5-94	35-48	6-10	36
37	36-54	5-79	36-52	5-95	36-49	6-11	36-47	6-27	37
38	37-53	5-94	37-51	6-11	37-48	6-27	37-45	6-44	38
39	38-52	6-10	38-49	6-27	38-47	6-44	38-44	6-60	39
40	39-51	6-26	39-48	6-43	39-45	6-60	39-42	6-77	40
41	40-50	6-41	40-47	6-59	40-44	6-77	40-41	6-94	41
42	41-48	6-57	41-45	6-75	41-42	6-92	41-39	7-11	42
43	42-47	6-73	42-44	6-91	42-41	7-10	42-38	7-28	43
44	43-46	6-88	43-43	7-07	43-40	7-26	43-36	7-45	44
45	44-45	7-04	44-41	7-23	44-38	7-43	44-35	7-62	45
46	45-43	7-20	45-40	7-39	45-37	7-59	45-34	7-79	46
47	46-42	7-35	46-39	7-55	46-36	7-76	46-32	7-96	47
48	47-41	7-51	47-38	7-72	47-34	7-92	47-31	8-13	48
49	48-40	7-67	48-36	7-88	48-33	8-09	48-29	8-30	49
50	49-38	7-82	49-35	8-04	49-32	8-25	49-28	8-47	50
Distance.	81 DEG.		80¾ DEG.		80½ DEG.		80¼ DEG.		Distance.
	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	

Distance.	9 DEG.		9 $\frac{1}{4}$ DEG.		9 $\frac{1}{2}$ DEG.		9 $\frac{3}{4}$ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	50:37	7:98	50:34	8:20	50:30	8:42	50:26	8 64	51
52	51:36	8:13	51:32	8:36	51:29	8:58	51:25	8:81	52
53	52:35	8:29	52:31	8:52	52:27	8:75	52:23	8:98	53
54	53:34	8:45	53:30	8:68	53:26	8:91	53:22	9:14	54
55	54:32	8:60	54:28	8:84	54:25	9:08	54:21	9:31	55
56	55:31	8:76	55:27	9:00	55:23	9:24	55:19	9:48	56
57	56:30	8:92	56:26	9:16	56:22	9:41	56:18	9:65	57
58	57:29	9:07	57:25	9:32	57:20	9:57	57:16	9:82	58
59	58:27	9:23	58:23	9:48	58:19	9:74	58:15	9:99	59
60	59:26	9:39	59:22	9:64	59:18	9:90	59:13	10:16	60
61	60:25	9:54	60:21	9:81	60:16	10:07	60:12	10:33	61
62	61:24	9:70	61:19	9:97	61:15	10:23	61:10	10:50	62
63	62:22	9:86	62:18	10:13	62:14	10:40	62:09	10:67	63
64	63:21	10:01	63:17	10:29	63:12	10:56	63:08	10:84	64
65	64:20	10:17	64:15	10:45	64:11	10:73	64:06	11:01	65
66	65:19	10:32	65:14	10:61	65:09	10:89	65:05	11:18	66
67	66:18	10:48	66:13	10:77	66:08	11:06	66:03	11:35	67
68	67:16	10:64	67:12	10:93	67:07	11:22	67:02	11:52	68
69	68:15	10:79	68:10	11:09	68:05	11:39	68:00	11:69	69
70	69:14	10:95	69:09	11:25	69:04	11:55	68:99	11:85	70
71	70:13	11:11	70:08	11:41	70:03	11:72	69:97	12:02	71
72	71:11	11:26	71:06	11:57	71:01	11:88	70:96	12:19	72
73	72:10	11:42	72:05	11:73	72:00	12:05	71:95	12:36	73
74	73:09	11:58	73:04	11:89	72:99	12:21	72:93	12:53	74
75	74:08	11:73	74:02	12:06	73:97	12:38	73:92	12:70	75
76	75:06	11:89	75:01	12:22	74:96	12:54	74:90	12:87	76
77	76:05	12:05	76:00	12:38	75:94	12:71	75:89	13:04	77
78	77:04	12:20	76:99	12:54	76:93	12:87	76:87	13:21	78
79	78:03	12:36	77:97	12:70	77:92	13:04	77:86	13:38	79
80	79:02	12:51	78:96	12:86	78:90	13:20	78:84	13:55	80
81	80:00	12:67	79:95	13:02	79:89	13:37	79:83	13:72	81
82	80:99	12:83	80:93	13:18	80:88	13:53	80:82	13:89	82
83	81:98	12:98	81:92	13:34	81:86	13:70	81:80	14:06	83
84	82:97	13:14	82:91	13:50	82:85	13:86	82:79	14:23	84
85	83:95	13:30	83:89	13:66	83:83	14:03	83:77	14:39	85
86	84:94	13:45	84:88	13:82	84:82	14:19	84:76	14:56	86
87	85:93	13:61	85:87	13:98	85:81	14:36	85:74	14:73	87
88	86:92	13:77	86:86	14:15	86:79	14:52	86:73	14:90	88
89	87:90	13:92	87:84	14:31	87:78	14:69	87:71	15:07	89
90	88:89	14:08	88:83	14:47	88:77	14:85	88:70	15:24	90
91	89:88	14:24	89:82	14:63	89:75	15:02	89:69	15:41	91
92	90:87	14:39	90:80	14:79	90:74	15:18	90:67	15:58	92
93	91:86	14:55	91:79	14:95	91:72	15:35	91:66	15:75	93
94	92:84	14:70	92:78	15:11	92:71	15:51	92:64	15:92	94
95	93:83	14:86	93:76	15:27	93:70	15:68	93:63	16:09	95
96	94:82	15:02	94:75	15:43	94:68	15:84	94:61	16:26	96
97	95:81	15:17	95:74	15:59	95:67	16:01	95:60	16:43	97
98	96:79	15:33	96:73	15:75	96:66	16:17	96:58	16:60	98
99	97:78	15:49	97:71	15:91	97:64	16:34	97:57	16:77	99
100	98:77	15:64	98:70	16:07	98:63	16:50	98:56	16:93	100
Distance.	81 DEG.		80 $\frac{1}{4}$ DEG.		80 $\frac{1}{2}$ DEG.		80 $\frac{3}{4}$ DEG.		Distance.
	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	

Distance.	10 DEG.		10 $\frac{1}{4}$ DEG.		10 $\frac{1}{2}$ DEG.		10 $\frac{3}{4}$ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	0°98	0°17	0°98	0°18	0°98	0°18	0°98	0°19	1
2	1°97	0°35	1°97	0°36	1°97	0°36	1°96	0°37	2
3	2°95	0°52	2°95	0°53	2°95	0°55	2°95	0°56	3
4	3°94	0°69	3°94	0°71	3°93	0°73	3°93	0°75	4
5	4°92	0°87	4°92	0°89	4°92	0°91	4°91	0°93	5
6	5°91	1°04	5°90	1°07	5°90	1°09	5°89	1°12	6
7	6°89	1°22	6°89	1°25	6°83	1°28	6°88	1°31	7
8	7°88	1°39	7°87	1°42	7°87	1°46	7°86	1°49	8
9	8°86	1°56	8°86	1°60	8°85	1°64	8°84	1°68	9
10	9°85	1°74	9°84	1°78	9°83	1°82	9°82	1°87	10
11	10°83	1°91	10°82	1°96	10°82	2°00	10°81	2°05	11
12	11°82	2°08	11°81	2°14	11°80	2°19	11°79	2°24	12
13	12°80	2°26	12°79	2°31	12°78	2°37	12°77	2°42	13
14	13°79	2°43	13°78	2°49	13°77	2°55	13°75	2°61	14
15	14°77	2°60	14°76	2°67	14°75	2°73	14°74	2°80	15
16	15°76	2°78	15°74	2°85	15°73	2°92	15°72	2°98	16
17	16°74	2°95	16°73	3°03	16°72	3°10	16°70	3°17	17
18	17°73	3°13	17°71	3°20	17°70	3°28	17°68	3°36	18
19	18°71	3°30	18°70	3°38	18°68	3°46	18°67	3°54	19
20	19°70	3°47	19°68	3°56	19°67	3°64	19°65	3°73	20
21	20°68	3°65	20°66	3°74	20°65	3°83	20°63	3°92	21
22	21°67	3°82	21°65	3°91	21°63	4°01	21°61	4°10	22
23	22°65	3°99	22°63	4°09	22°61	4°19	22°60	4°29	23
24	23°64	4°17	23°62	4°27	23°60	4°37	23°58	4°48	24
25	24°62	4°34	24°60	4°45	24°58	4°56	24°56	4°66	25
26	25°61	4°51	25°59	4°63	25°56	4°74	25°54	4°85	26
27	26°59	4°69	26°57	4°80	26°55	4°92	26°53	5°04	27
28	27°57	4°86	27°55	4°98	27°53	5°10	27°51	5°22	28
29	28°56	5°04	28°54	5°16	28°51	5°28	28°49	5°41	29
30	29°54	5°21	29°52	5°34	29°50	5°47	29°47	5°60	30
31	30°53	5°38	30°51	5°52	30°48	5°65	30°46	5°78	31
32	31°51	5°56	31°49	5°69	31°46	5°83	31°44	5°97	32
33	32°50	5°73	32°47	5°87	32°45	6°01	32°42	6°16	33
34	33°48	5°90	33°46	6°05	33°43	6°20	33°40	6°34	34
35	34°47	6°08	34°44	6°23	34°41	6°38	34°39	6°53	35
36	35°45	6°25	35°43	6°41	35°40	6°56	35°37	6°71	36
37	36°44	6°42	36°41	6°58	36°38	6°74	36°35	6°90	37
38	37°42	6°60	37°39	6°76	37°36	6°92	37°33	7°09	38
39	38°41	6°77	38°38	6°94	38°35	7°11	38°32	7°27	39
40	39°39	6°95	39°36	7°12	39°33	7°29	39°30	7°46	40
41	40°38	7°12	40°35	7°30	40°31	7°47	40°28	7°65	41
42	41°36	7°29	41°33	7°47	41°30	7°65	41°26	7°83	42
43	42°35	7°47	42°31	7°65	42°28	7°84	42°25	8°02	43
44	43°33	7°64	43°30	7°83	43°26	8°02	43°23	8°21	44
45	44°32	7°81	44°28	8°01	44°25	8°20	44°21	8°39	45
46	45°30	7°99	45°27	8°19	45°23	8°38	45°19	8°58	46
47	46°29	8°16	46°25	8°36	46°21	8°57	46°18	8°77	47
48	47°27	8°34	47°23	8°54	47°20	8°75	47°16	8°95	48
49	48°26	8°51	48°22	8°72	48°18	8°93	48°14	9°14	49
50	49°24	8°68	49°20	8°90	49°16	9°11	49°12	9°33	50
Distance.	80 DEG.		79 $\frac{1}{4}$ DEG.		79 $\frac{1}{2}$ DEG.		79 $\frac{3}{4}$ DEG.		Distance.
	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	

Distance.	10 DEG.		10 $\frac{1}{4}$ DEG.		10 $\frac{1}{2}$ DEG.		10 $\frac{3}{4}$ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	50-23	8-86	50-19	9-08	50-15	9-29	50-10	9-51	51
52	51-21	9-03	51-17	9-25	51-13	9-48	51-09	9-70	52
53	52-19	9-20	52-15	9-43	52-11	9-66	52-07	9-89	53
54	53-18	9-38	53-14	9-61	53-10	9-84	53-05	10-07	54
55	54-16	9-55	54-12	9-79	54-08	10-02	54-03	10-26	55
56	55-15	9-72	55-11	9-96	55-06	10-21	55-02	10-45	56
57	56-13	9-90	56-09	10-14	56-05	10-39	56-00	10-63	57
58	57-12	10-07	57-07	10-32	57-03	10-57	56-98	10-82	58
59	58-10	10-25	58-06	10-50	58-01	10-75	57-96	11-00	59
60	59-09	10-42	59-04	10-68	59-00	10-93	58-95	11-19	60
61	60-07	10-59	60-03	10-85	59-98	11-12	59-93	11-38	61
62	61-06	10-77	61-01	11-03	60-96	11-30	60-91	11-56	62
63	62-04	10-94	61-99	11-21	61-95	11-48	61-89	11-75	63
64	63-03	11-11	62-98	11-39	62-93	11-66	62-88	11-94	64
65	64-01	11-29	63-96	11-57	63-91	11-85	63-86	12-12	65
66	65-00	11-46	64-95	11-74	64-89	12-03	64-84	12-31	66
67	65-98	11-63	65-93	11-92	65-88	12-21	65-82	12-50	67
68	66-97	11-81	66-91	12-10	66-86	12-39	66-81	12-68	68
69	67-95	11-98	67-90	12-28	67-84	12-57	67-79	12-87	69
70	68-94	12-16	68-88	12-46	68-83	12-76	68-77	13-06	70
71	69-92	12-33	69-87	12-63	69-81	12-94	69-75	13-24	71
72	70-91	12-50	70-85	12-81	70-79	13-12	70-74	13-43	72
73	71-89	12-68	71-83	12-99	71-78	13-30	71-72	13-62	73
74	72-88	12-85	72-82	13-17	72-76	13-49	72-70	13-80	74
75	73-86	13-02	73-80	13-35	73-74	13-67	73-68	13-99	75
76	74-85	13-20	74-79	13-52	74-73	13-85	74-67	14-18	76
77	75-83	13-37	75-77	13-70	75-71	14-03	75-65	14-36	77
78	76-82	13-54	76-76	13-88	76-69	14-21	76-63	14-55	78
79	77-80	13-72	77-74	14-06	77-68	14-40	77-61	14-74	79
80	78-78	13-89	78-72	14-24	78-66	14-58	78-60	14-92	80
81	79-77	14-07	79-71	14-41	79-64	14-76	79-58	15-11	81
82	80-75	14-24	80-69	14-59	80-63	14-94	80-56	15-29	82
83	81-74	14-41	81-68	14-77	81-61	15-13	81-54	15-48	83
84	82-72	14-59	82-66	14-95	82-59	15-31	82-53	15-67	84
85	83-71	14-76	83-64	15-13	83-58	15-49	83-51	15-85	85
86	84-69	14-93	84-63	15-30	84-56	15-67	84-49	16-04	86
87	85-68	15-11	85-61	15-48	85-54	15-85	85-47	16-23	87
88	86-66	15-28	86-60	15-66	86-53	16-04	86-46	16-41	88
89	87-65	15-45	87-58	15-84	87-51	16-22	87-44	16-60	89
90	88-63	15-63	88-56	16-01	88-49	16-40	88-42	16-79	90
91	89-62	15-80	89-55	16-19	89-48	16-58	89-40	16-97	91
92	90-60	15-98	90-53	16-37	90-46	16-77	90-39	17-16	92
93	91-59	16-15	91-52	16-55	91-44	16-95	91-37	17-35	93
94	92-57	16-32	92-50	16-73	92-43	17-13	92-35	17-53	94
95	93-56	16-50	93-48	16-90	93-41	17-31	93-33	17-72	95
96	94-54	16-67	94-47	17-08	94-39	17-49	94-32	17-91	96
97	95-53	16-84	95-45	17-26	95-38	17-68	95-30	18-09	97
98	96-51	17-02	96-44	17-44	96-36	17-86	96-28	18-28	98
99	97-50	17-19	97-42	17-62	97-34	18-04	97-26	18-47	99
100	98-48	17-36	98-40	17-79	98-33	18-22	98-25	18-65	100
Distance.	80 DEG.		79 $\frac{1}{4}$ DEG.		79 $\frac{1}{2}$ DEG.		79 $\frac{3}{4}$ DEG.		Distance.
	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	

Distance.	11 DEG.		11 $\frac{1}{4}$ DEG.		11 $\frac{1}{2}$ DEG.		11 $\frac{3}{4}$ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	0-98	0-19	0-98	0-20	0-98	0-20	0-98	0-20	1
2	1-96	0-38	1-96	0-39	1-96	0-40	1-96	0-41	2
3	2-94	0-57	2-94	0-59	2-94	0-60	2-94	0-61	3
4	3-93	0-76	3-92	0-78	3-92	0-80	3-92	0-82	4
5	4-91	0-95	4-90	0-98	4-90	1-00	4-90	1-02	5
6	5-89	1-14	5-88	1-17	5-88	1-20	5-87	1-22	6
7	6-87	1-34	6-87	1-37	6-86	1-40	6-85	1-43	7
8	7-85	1-53	7-85	1-56	7-84	1-59	7-83	1-63	8
9	8-83	1-72	8-83	1-76	8-82	1-79	8-81	1-83	9
10	9-82	1-91	9-81	1-95	9-80	1-99	9-79	2-04	10
11	10-80	2-10	10-79	2-15	10-78	2-19	10-77	2-24	11
12	11-78	2-29	11-77	2-34	11-76	2-39	11-75	2-44	12
13	12-76	2-48	12-75	2-54	12-74	2-59	12-73	2-65	13
14	13-74	2-67	13-73	2-73	13-72	2-79	13-71	2-85	14
15	14-72	2-86	14-71	2-93	14-70	2-99	14-69	3-06	15
16	15-71	3-05	15-69	3-12	15-68	3-19	15-66	3-26	16
17	16-69	3-24	16-67	3-32	16-66	3-39	16-64	3-46	17
18	17-67	3-43	17-65	3-51	17-64	3-59	17-62	3-66	18
19	18-65	3-63	18-63	3-71	18-62	3-79	18-60	3-87	19
20	19-63	3-82	19-62	3-90	19-60	3-99	19-58	4-07	20
21	20-61	4-01	20-60	4-10	20-58	4-19	20-56	4-28	21
22	21-60	4-20	21-58	4-29	21-56	4-39	21-54	4-48	22
23	22-58	4-39	22-56	4-49	22-54	4-59	22-52	4-68	23
24	23-56	4-58	23-54	4-68	23-52	4-78	23-50	4-89	24
25	24-54	4-77	24-52	4-88	24-50	4-98	24-48	5-09	25
26	25-52	4-96	25-50	5-07	25-48	5-18	25-46	5-30	26
27	26-50	5-15	26-48	5-27	26-46	5-38	26-43	5-50	27
28	27-49	5-34	27-46	5-46	27-44	5-58	27-41	5-70	28
29	28-47	5-53	28-44	5-66	28-42	5-78	28-39	5-91	29
30	29-45	5-72	29-42	5-85	29-40	5-98	29-37	6-11	30
31	30-43	5-92	30-40	6-05	30-38	6-18	30-35	6-31	31
32	31-41	6-11	31-39	6-24	31-36	6-38	31-33	6-52	32
33	32-39	6-30	32-37	6-44	32-34	6-58	32-31	6-72	33
34	33-38	6-49	33-35	6-63	33-32	6-78	33-29	6-92	34
35	34-36	6-68	34-33	6-83	34-30	6-98	34-27	7-13	35
36	35-34	6-87	35-31	7-02	35-28	7-18	35-25	7-33	36
37	36-32	7-06	36-29	7-22	36-26	7-38	36-22	7-53	37
38	37-30	7-25	37-27	7-41	37-24	7-58	37-20	7-74	38
39	38-28	7-44	38-25	7-61	38-22	7-78	38-18	7-94	39
40	39-27	7-63	39-23	7-80	39-20	7-97	39-16	8-15	40
41	40-25	7-82	40-21	8-00	40-18	8-17	40-14	8-35	41
42	41-23	8-01	41-19	8-19	41-16	8-37	41-12	8-55	42
43	42-21	8-20	42-17	8-39	42-14	8-57	42-10	8-76	43
44	43-19	8-40	43-15	8-58	43-12	8-77	43-08	8-96	44
45	44-17	8-59	44-14	8-78	44-10	8-97	44-06	9-16	45
46	45-15	8-78	45-12	8-97	45-08	9-17	45-04	9-37	46
47	46-14	8-97	46-10	9-17	46-06	9-37	46-02	9-57	47
48	47-12	9-16	47-08	9-36	47-04	9-57	46-99	9-78	48
49	48-10	9-35	48-06	9-56	48-02	9-77	47-97	9-98	49
50	49-08	9-54	49-04	9-75	49-00	9-97	48-95	10-18	50
Distance.	79 DEG.		78 $\frac{1}{4}$ DEG.		78 $\frac{1}{2}$ DEG.		78 $\frac{3}{4}$ DEG.		Distance.
	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	

Distance.	11 DEG.		11½ DEG.		11¾ DEG.		11½ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	50-06	9-73	50-02	9-95	49-98	10-17	49-93	10-39	51
52	51-04	9-92	51-00	10-14	50-96	10-37	50-91	10-59	52
53	52-03	10-11	51-98	10-34	51-94	10-57	51-89	10-79	53
54	53-01	10-30	52-96	10-53	52-92	10-77	52-87	11-00	54
55	53-99	10-49	53-94	10-73	53-90	10-97	53-85	11-20	55
56	54-97	10-69	54-92	10-93	54-88	11-16	54-83	11-40	56
57	55-95	10-88	55-90	11-12	55-86	11-36	55-81	11-61	57
58	56-93	11-07	56-89	11-32	56-84	11-56	56-78	11-81	58
59	57-92	11-25	57-87	11-51	57-82	11-76	57-76	12-01	59
60	58-90	11-45	58-85	11-71	58-80	11-96	58-74	12-22	60
61	59-88	11-64	59-83	11-90	59-78	12-16	59-72	12-42	61
62	60-86	11-83	60-81	12-10	60-76	12-36	60-70	12-63	62
63	61-84	12-02	61-79	12-29	61-74	12-56	61-68	12-83	63
64	62-82	12-21	62-77	12-49	62-72	12-76	62-66	13-03	64
65	63-81	12-40	63-75	12-68	63-70	12-96	63-64	13-24	65
66	64-79	12-59	64-73	12-88	64-68	13-16	64-62	13-44	66
67	65-77	12-78	65-71	13-07	65-66	13-36	65-60	13-64	67
68	66-75	12-98	66-69	13-27	66-63	13-56	66-58	13-85	68
69	67-73	13-17	67-67	13-46	67-61	13-76	67-55	14-05	69
70	68-71	13-36	68-66	13-66	68-59	13-96	68-53	14-25	70
71	69-70	13-55	69-64	13-85	69-57	14-16	69-51	14-46	71
72	70-68	13-74	70-62	14-05	70-55	14-35	70-49	14-66	72
73	71-66	13-93	71-60	14-24	71-53	14-55	71-47	14-87	73
74	72-64	14-12	72-58	14-44	72-51	14-75	72-45	15-07	74
75	73-62	14-31	73-56	14-63	73-49	14-95	73-43	15-27	75
76	74-60	14-50	74-54	14-83	74-47	15-15	74-41	15-48	76
77	75-59	14-69	75-52	15-02	75-45	15-35	75-39	15-68	77
78	76-57	14-88	76-50	15-22	76-43	15-55	76-37	15-88	78
79	77-55	15-07	77-48	15-41	77-41	15-75	77-34	16-09	79
80	78-53	15-26	78-46	15-61	78-39	15-95	78-32	16-29	80
81	79-51	15-46	79-44	15-80	79-37	16-15	79-30	16-49	81
82	80-49	15-65	80-42	16-00	80-35	16-35	80-28	16-70	82
83	81-48	15-84	81-41	16-19	81-33	16-55	81-26	16-90	83
84	82-46	16-03	82-39	16-39	82-31	16-75	82-24	17-11	84
85	83-44	16-22	83-37	16-58	83-29	16-95	83-22	17-31	85
86	84-42	16-41	84-35	16-78	84-27	17-15	84-20	17-51	86
87	85-40	16-60	85-33	16-97	85-25	17-35	85-18	17-72	87
88	86-38	16-79	86-31	17-17	86-23	17-54	86-16	17-92	88
89	87-36	16-98	87-29	17-36	87-21	17-74	87-14	18-12	89
90	88-35	17-17	88-27	17-56	88-19	17-94	88-11	18-33	90
91	89-33	17-36	89-25	17-75	89-17	18-14	89-09	18-53	91
92	90-31	17-55	90-23	17-95	90-15	18-34	90-07	18-74	92
93	91-29	17-75	91-21	18-14	91-13	18-54	91-05	18-94	93
94	92-27	17-94	92-19	18-34	92-11	18-74	92-03	19-14	94
95	93-25	18-13	93-17	18-53	93-09	18-94	93-01	19-35	95
96	94-24	18-32	94-16	18-73	94-07	19-14	93-99	19-55	96
97	95-22	18-51	95-14	18-92	95-05	19-34	94-97	19-75	97
98	96-20	18-70	96-12	19-12	96-03	19-54	95-95	19-96	98
99	97-18	18-89	97-10	19-31	97-01	19-74	96-93	20-16	99
100	98-16	19-08	98-08	19-51	97-99	19-94	97-90	20-36	100
Distance.	79 DEG.		78½ DEG.		78¾ DEG.		78½ DEG.		Distance.
	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	

Distance.	12 DEG.		12½ DEG.		12½ DEG.		12¾ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	0 93	0 21	0 98	0 21	0 98	0 22	0 98	0 22	1
2	1 96	0 42	1 95	0 42	1 95	0 43	1 95	0 44	2
3	2 93	0 62	2 93	0 64	2 93	0 65	2 93	0 66	3
4	3 91	0 83	3 91	0 85	3 91	0 87	3 90	0 88	4
5	4 89	1 04	4 89	1 06	4 88	1 08	4 88	1 10	5
6	5 87	1 25	5 86	1 27	5 86	1 30	5 85	1 32	6
7	6 85	1 46	6 84	1 49	6 83	1 52	6 83	1 54	7
8	7 83	1 66	7 82	1 70	7 81	1 73	7 80	1 77	8
9	8 80	1 87	8 80	1 91	8 79	1 95	8 78	1 99	9
10	9 78	2 08	9 77	2 12	9 76	2 16	9 75	2 21	10
11	10 76	2 29	10 75	2 33	10 74	2 38	10 73	2 43	11
12	11 74	2 49	11 73	2 55	11 72	2 60	11 70	2 65	12
13	12 72	2 70	12 70	2 76	12 69	2 81	12 68	2 87	13
14	13 69	2 91	13 68	2 97	13 67	3 03	13 65	3 09	14
15	14 67	3 12	14 66	3 18	14 64	3 25	14 63	3 31	15
16	15 65	3 33	15 64	3 39	15 62	3 46	15 61	3 53	16
17	16 63	3 53	16 61	3 61	16 60	3 68	16 58	3 75	17
18	17 61	3 74	17 59	3 82	17 57	3 90	17 56	3 97	18
19	18 58	3 95	18 57	4 03	18 55	4 11	18 53	4 19	19
20	19 56	4 16	19 54	4 24	19 53	4 33	19 51	4 41	20
21	20 54	4 37	20 52	4 46	20 50	4 55	20 48	4 63	21
22	21 52	4 57	21 50	4 67	21 48	4 76	21 46	4 86	22
23	22 50	4 78	22 48	4 88	22 45	4 98	22 43	5 08	23
24	23 48	4 99	23 45	5 09	23 43	5 19	23 41	5 30	24
25	24 45	5 20	24 43	5 30	24 41	5 41	24 38	5 52	25
26	25 43	5 41	25 41	5 52	25 38	5 63	25 36	5 74	26
27	26 41	5 61	26 39	5 73	26 36	5 84	26 33	5 96	27
28	27 39	5 82	27 36	5 94	27 34	6 06	27 31	6 18	28
29	28 37	6 03	28 34	6 15	28 31	6 28	28 28	6 40	29
30	29 34	6 24	29 32	6 37	29 29	6 49	29 26	6 62	30
31	30 32	6 45	30 29	6 58	30 27	6 71	30 24	6 84	31
32	31 30	6 65	31 27	6 79	31 24	6 93	31 21	7 06	32
33	32 28	6 86	32 25	7 00	32 22	7 14	32 19	7 28	33
34	33 26	7 07	33 23	7 21	33 19	7 36	33 16	7 50	34
35	34 24	7 28	34 20	7 43	34 17	7 58	34 14	7 72	35
36	35 21	7 48	35 18	7 64	35 15	7 79	35 11	7 95	36
37	36 19	7 69	36 16	7 85	36 12	8 01	36 09	8 17	37
38	37 17	7 90	37 13	8 06	37 10	8 22	37 06	8 39	38
39	38 15	8 11	38 11	8 27	38 08	8 44	38 04	8 61	39
40	39 13	8 32	39 09	8 49	39 05	8 66	39 01	8 83	40
41	40 10	8 52	40 07	8 70	40 03	8 87	39 99	9 05	41
42	41 08	8 73	41 04	8 91	41 00	9 09	40 96	9 27	42
43	42 06	8 94	42 02	9 12	41 98	9 31	41 94	9 49	43
44	43 04	9 15	43 00	9 34	42 96	9 52	42 92	9 71	44
45	44 02	9 36	43 98	9 55	43 93	9 74	43 89	9 93	45
46	44 99	9 56	44 95	9 76	44 91	9 96	44 87	10 15	46
47	45 97	9 77	45 93	9 97	45 89	10 17	45 84	10 37	47
48	46 95	9 98	46 91	10 18	46 86	10 39	46 82	10 59	48
49	47 93	10 19	47 88	10 40	47 84	10 61	47 79	10 81	49
50	48 91	10 40	48 86	10 61	48 81	10 82	48 77	11 03	50
Distance.	78 DEG.		77½ DEG.		77½ DEG.		77¼ DEG.		Distance.
	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	

Distance.	12 DEG.		12 $\frac{1}{2}$ DEG.		12 $\frac{1}{2}$ DEG.		12 $\frac{1}{2}$ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	49-89	10-60	49-84	10-82	49-79	11-04	49-74	11-23	51
52	50-86	10-81	50-82	11-03	50-77	11-25	50-72	11-43	52
53	51-84	11-02	51-79	11-25	51-74	11-47	51-69	11-70	53
54	52-82	11-23	52-77	11-46	52-72	11-69	52-67	11-92	54
55	53-80	11-44	53-75	11-67	53-70	11-90	53-64	12-14	55
56	54-78	11-64	54-72	11-88	54-67	12-12	54-62	12-36	56
57	55-75	11-85	55-70	12-09	55-65	12-34	55-59	12-58	57
58	56-73	12-06	56-68	12-31	56-63	12-55	56-57	12-80	58
59	57-71	12-27	57-66	12-52	57-60	12-77	57-55	13-02	59
60	58-69	12-47	58-63	12-73	58-58	12-99	58-52	13-24	60
61	59-67	12-68	59-61	12-94	59-55	13-20	59-50	13-46	61
62	60-65	12-89	60-59	13-16	60-53	13-42	60-47	13-68	62
63	61-62	13-10	61-57	13-37	61-51	13-64	61-45	13-90	63
64	62-60	13-31	62-54	13-58	62-48	13-85	62-42	14-12	64
65	63-58	13-51	63-52	13-79	63-46	14-07	63-40	14-35	65
66	64-56	13-72	64-50	14-00	64-44	14-29	64-37	14-57	66
67	65-54	13-93	65-47	14-22	65-41	14-50	65-35	14-79	67
68	66-51	14-14	66-45	14-43	66-39	14-72	66-32	15-01	68
69	67-49	14-35	67-43	14-64	67-36	14-93	67-30	15-23	69
70	68-47	14-55	68-41	14-85	68-34	15-15	68-27	15-45	70
71	69-45	14-76	69-38	15-06	69-32	15-37	69-25	15-67	71
72	70-43	14-97	70-36	15-28	70-29	15-58	70-22	15-89	72
73	71-40	15-18	71-34	15-49	71-27	15-80	71-20	16-11	73
74	72-38	15-39	72-32	15-70	72-25	16-02	72-18	16-33	74
75	73-36	15-59	73-29	15-91	73-22	16-23	73-15	16-55	75
76	74-34	15-80	74-27	16-13	74-20	16-45	74-13	16-77	76
77	75-32	16-01	75-25	16-34	75-17	16-67	75-10	16-99	77
78	76-30	16-22	76-22	16-55	76-15	16-88	76-08	17-21	78
79	77-27	16-43	77-20	16-76	77-13	17-10	77-05	17-44	79
80	78-25	16-63	78-18	16-97	78-10	17-32	78-03	17-66	80
81	79-23	16-84	79-16	17-19	79-08	17-53	79-00	17-88	81
82	80-21	17-05	80-13	17-40	80-06	17-75	79-98	18-10	82
83	81-19	17-26	81-11	17-61	81-03	17-96	80-95	18-32	83
84	82-16	17-46	82-09	17-82	82-01	18-18	81-93	18-54	84
85	83-14	17-67	83-06	18-04	82-99	18-40	82-90	18-76	85
86	84-12	17-88	84-04	18-25	83-96	18-61	83-88	18-98	86
87	85-10	18-09	85-02	18-46	84-94	18-83	84-85	19-20	87
88	86-08	18-30	86-00	18-67	85-91	19-05	85-83	19-42	88
89	87-06	18-50	86-97	18-88	86-89	19-26	86-81	19-64	89
90	88-03	18-71	87-95	19-10	87-87	19-48	87-78	19-86	90
91	89-01	18-92	88-93	19-31	88-84	19-70	88-76	20-08	91
92	89-99	19-13	89-91	19-52	89-82	19-91	89-73	20-30	92
93	90-97	19-34	90-88	19-73	90-80	20-13	90-71	20-52	93
94	91-95	19-54	91-86	19-94	91-77	20-35	91-68	20-75	94
95	92-92	19-75	92-84	20-16	92-75	20-56	92-66	20-97	95
96	93-90	19-96	93-81	20-37	93-72	20-78	93-63	21-19	96
97	94-88	20-17	94-79	20-58	94-70	20-99	94-61	21-41	97
98	95-86	20-38	95-77	20-79	95-68	21-21	95-58	21-63	98
99	96-84	20-58	96-75	21-01	96-65	21-43	96-56	21-85	99
100	97-81	20-79	97-72	21-22	97-63	21-64	97-53	22-07	100
Distance.	78 DEG.		77 $\frac{1}{2}$ DEG.		77 $\frac{1}{2}$ DEG.		77 $\frac{1}{2}$ DEG.		Distance.
	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	

Distance.	13 DEG.		13½ DEG.		13½ DEG.		13¾ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	0-97	0-23	0 97	0-23	0-97	0-23	0-97	0-24	1
2	1-95	0-45	1-95	0-46	1-95	0-47	1-94	0-48	2
3	2-92	0-67	2-92	0-69	2-92	0-70	2-91	0-71	3
4	3-90	0-90	3-89	0-92	3-89	0-93	3-89	0-95	4
5	4-87	1-12	4-87	1-15	4-86	1-17	4-86	1-19	5
6	5-85	1-35	5-84	1-38	5-83	1-40	5-83	1-43	6
7	6-82	1-57	6-81	1-60	6-81	1-63	6-80	1-66	7
8	7-80	1-89	7-79	1-83	7-78	1-87	7-77	1-90	8
9	8-77	2-02	8-76	2-06	8-75	2-10	8-74	2-14	9
10	9-74	2-25	9-73	2-29	9-72	2-33	9-71	2-38	10
11	10-72	2-47	10-71	2-52	10-70	2-57	10-68	2-61	11
12	11-69	2-70	11-68	2-75	11-67	2-80	11-66	2-85	12
13	12-67	2-92	12-65	2-98	12-64	3-03	12-63	3-09	13
14	13-64	3-15	13-63	3-21	13-61	3-27	13-60	3-33	14
15	14-62	3-37	14-60	3-44	14-59	3-50	14-57	3-57	15
16	15-59	3-60	15-57	3-67	15-56	3-74	15-54	3-80	16
17	16-57	3-82	16-55	3-90	16-53	3-97	16-51	4-04	17
18	17-54	4-05	17-52	4-13	17-50	4-20	17-48	4-28	18
19	18-51	4-27	18-49	4-35	18-48	4-44	18-46	4-52	19
20	19-49	4-50	19-47	4-58	19-45	4-67	19-43	4-75	20
21	20-46	4-72	20-44	4-81	20-42	4-90	20-40	4-99	21
22	21-44	4-95	21-41	5-04	21-39	5-14	21-37	5-23	22
23	22-41	5-17	22-39	5-27	22-36	5-37	22-34	5-47	23
24	23-38	5-40	23-36	5-50	23-34	5-60	23-31	5-70	24
25	24-36	5-62	24-33	5-73	24-31	5-84	24-28	5-94	25
26	25-33	5-85	25-31	5-96	25-28	6-07	25-25	6-18	26
27	26-31	6-07	26-28	6-19	26-25	6-30	26-23	6-42	27
28	27-28	6-30	27-25	6-42	27-23	6-54	27-20	6-66	28
29	28-26	6-52	28-23	6-65	28-20	6-77	28-17	6-89	29
30	29-23	6-75	29-20	6-88	29-17	7-00	29-14	7-13	30
31	30-21	6-97	30-17	7-11	30-14	7-24	30-11	7-37	31
32	31-18	7-20	31-15	7-33	31-12	7-47	31-08	7-61	32
33	32-15	7-42	32-12	7-56	32-09	7-70	32-05	7-84	33
34	33-13	7-65	33-09	7-79	33-06	7-94	33-03	8-08	34
35	34-10	7-87	34-07	8-02	34-03	8-17	34-00	8-32	35
36	35-08	8-10	35-04	8-25	35-01	8-40	34-97	8-56	36
37	36-05	8-32	36-02	8-48	35-98	8-64	35-94	8-79	37
38	37-03	8-55	36-99	8-71	36-95	8-87	36-91	9-03	38
39	38-00	8-77	37-96	8-94	37-92	9-10	37-88	9-27	39
40	38-97	9-00	38-94	9-17	38-89	9-34	38-85	9-51	40
41	39-95	9-22	39-91	9-40	39-87	9-57	39-83	9-75	41
42	40-92	9-45	40-88	9-63	40-84	9-80	40-80	9-98	42
43	41-90	9-67	41-86	9-86	41-81	10-04	41-77	10-22	43
44	42-87	9-90	42-83	10-08	42-78	10-27	42-74	10-46	44
45	43-85	10-12	43-80	10-31	43-76	10-51	43-71	10-70	45
46	44-82	10-35	44-78	10-54	44-73	10-74	44-68	10-93	46
47	45-80	10-57	45-75	10-77	45-70	10-97	45-65	11-17	47
48	46-77	10-80	46-72	11-00	46-67	11-21	46-62	11-41	48
49	47-74	11-02	47-70	11-23	47-65	11-44	47-60	11-65	49
50	48-72	11-25	48-67	11-46	48-62	11-67	48-57	11-88	50
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	77 DEG.		76½ DEG.		76½ DEG.		76½ DEG.		

Distance.	13 DEG.		13 $\frac{1}{2}$ DEG.		13 $\frac{1}{2}$ DEG.		13 $\frac{1}{2}$ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	49-69	11-47	49-64	11-69	49-59	11-91	49-54	12-12	51
52	50-67	11-70	50-62	11-92	50-56	12-14	50-51	12-36	52
53	51-64	11-92	51-59	12-15	51-54	12-37	51-48	12-60	53
54	52-62	12-15	52-56	12-38	52-51	12-61	52-45	12-84	54
55	53-59	12-37	53-54	12-61	53-48	12-84	53-42	13-07	55
56	54-56	12-60	54-51	12-84	54-45	13-07	54-40	13-31	56
57	55-54	12-82	55-48	13-06	55-43	13-31	55-37	13-55	57
58	56-51	13-05	56-46	13-29	56-40	13-54	56-34	13-79	58
59	57-49	13-27	57-43	13-52	57-37	13-77	57-31	14-02	59
60	58-46	13-50	58-40	13-75	58-34	14-01	58-28	14-26	60
61	59-44	13-72	59-38	13-98	59-31	14-24	59-25	14-50	61
62	60-41	13-95	60-35	14-21	60-29	14-47	60-22	14-74	62
63	61-39	14-17	61-32	14-44	61-26	14-71	61-19	14-97	63
64	62-36	14-40	62-30	14-67	62-23	14-94	62-17	15-21	64
65	63-33	14-62	63-27	14-90	63-20	15-17	63-14	15-45	65
66	64-31	14-85	64-24	15-13	64-18	15-41	64-11	15-69	66
67	65-28	15-07	65-22	15-36	65-15	15-64	65-08	15-93	67
68	66-26	15-30	66-19	15-59	66-12	15-87	66-05	16-16	68
69	67-23	15-52	67-16	15-81	67-09	16-11	67-02	16-40	69
70	68-21	15-75	68-14	16-04	68-07	16-34	67-99	16-64	70
71	69-18	15-97	69-11	16-27	69-04	16-57	68-97	16-88	71
72	70-15	16-20	70-08	16-50	70-01	16-81	69-94	17-11	72
73	71-13	16-42	71-06	16-73	70-98	17-04	70-91	17-35	73
74	72-10	16-65	72-03	16-96	71-96	17-28	71-88	17-59	74
75	73-08	16-87	73-00	17-19	72-93	17-50	72-85	17-83	75
76	74-05	17-10	73-98	17-42	73-90	17-74	73-82	18-06	76
77	75-03	17-32	74-95	17-65	74-87	17-98	74-79	18-30	77
78	76-00	17-55	75-92	17-88	75-84	18-21	75-76	18-54	78
79	76-98	17-77	76-90	18-11	76-82	18-44	76-74	18-78	79
80	77-95	18-00	77-87	18-34	77-79	18-68	77-71	19-01	80
81	78-92	18-22	78-84	18-57	78-76	18-91	78-68	19-25	81
82	79-90	18-45	79-82	18-79	79-73	19-14	79-65	19-49	82
83	80-87	18-67	80-79	19-02	80-71	19-38	80-62	19-73	83
84	81-85	18-90	81-76	19-25	81-68	19-61	81-59	19-97	84
85	82-82	19-12	82-74	19-48	82-65	19-84	82-56	20-20	85
86	83-80	19-35	83-71	19-71	83-62	20-08	83-54	20-44	86
87	84-77	19-57	84-68	19-94	84-60	20-31	84-51	20-68	87
88	85-74	19-80	85-66	20-17	85-57	20-54	85-48	20-92	88
89	86-72	20-02	86-63	20-40	86-54	20-78	86-45	21-15	89
90	87-69	20-25	87-60	20-63	87-51	21-01	87-42	21-39	90
91	88-67	20-47	88-58	20-86	88-49	21-24	88-39	21-63	91
92	89-64	20-70	89-55	21-09	89-46	21-48	89-36	21-87	92
93	90-62	20-92	90-52	21-32	90-43	21-71	90-33	22-10	93
94	91-59	21-15	91-50	21-54	91-40	21-94	91-31	22-34	94
95	92-57	21-37	92-47	21-77	92-38	22-18	92-28	22-58	95
96	93-54	21-60	93-44	22-00	93-35	22-41	93-25	22-82	96
97	94-51	21-82	94-42	22-23	94-32	22-64	94-22	23-06	97
98	95-49	22-05	95-39	22-46	95-29	22-88	95-19	23-29	98
99	96-46	22-27	96-36	22-69	96-26	23-11	96-16	23-53	99
100	97-44	22-50	97-34	22-92	97-24	23-34	97-13	23-77	100
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	77 DEG.		76 $\frac{1}{2}$ DEG.		76 $\frac{1}{2}$ DEG.		76 $\frac{1}{2}$ DEG.		

Distance.	14 DEG.		14½ DEG.		14½ DEG.		14¾ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	0·97	0·24	0·97	0·25	0·97	0·25	0·97	0·25	1
2	1·94	0·48	1·94	0·49	1·94	0·50	1·93	0·51	2
3	2·91	0·73	2·91	0·74	2·90	0·75	2·90	0·76	3
4	3·88	0·97	3·88	0·98	3·87	1·00	3·87	1·02	4
5	4·85	1·21	4·85	1·23	4·84	1·25	4·84	1·27	5
6	5·82	1·45	5·82	1·48	5·81	1·50	5·80	1·53	6
7	6·79	1·69	6·78	1·72	6·78	1·75	6·77	1·78	7
8	7·76	1·94	7·75	1·97	7·75	2·00	7·74	2·04	8
9	8·73	2·18	8·72	2·22	8·71	2·25	8·70	2·29	9
10	9·70	2·42	9·69	2·46	9·68	2·50	9·67	2·55	10
11	10·67	2·66	10·66	2·71	10·65	2·75	10·64	2·80	11
12	11·64	2·90	11·63	2·95	11·62	3·00	11·60	3·06	12
13	12·61	3·15	12·60	3·20	12·59	3·25	12·57	3·31	13
14	13·58	3·39	13·57	3·45	13·55	3·51	13·54	3·56	14
15	14·55	3·63	14·54	3·69	14·52	3·76	14·51	3·82	15
16	15·52	3·87	15·51	3·94	15·49	4·01	15·47	4·07	16
17	16·50	4·11	16·48	4·18	16·46	4·26	16·44	4·33	17
18	17·47	4·35	17·45	4·43	17·43	4·51	17·41	4·58	18
19	18·44	4·60	18·42	4·68	18·39	4·76	18·37	4·84	19
20	19·41	4·84	19·38	4·92	19·36	5·01	19·34	5·09	20
21	20·38	5·08	20·35	5·17	20·33	5·26	20·31	5·35	21
22	21·35	5·32	21·32	5·42	21·30	5·51	21·28	5·60	22
23	22·32	5·56	22·29	5·66	22·27	5·76	22·24	5·86	23
24	23·29	5·81	23·26	5·91	23·24	6·01	23·21	6·11	24
25	24·26	6·05	24·23	6·15	24·20	6·26	24·18	6·37	25
26	25·23	6·29	25·20	6·40	25·17	6·51	25·14	6·62	26
27	26·20	6·53	26·17	6·65	26·14	6·76	26·11	6·87	27
28	27·17	6·77	27·14	6·89	27·11	7·01	27·08	7·13	28
29	28·14	7·02	28·11	7·14	28·08	7·26	28·04	7·38	29
30	29·11	7·26	29·08	7·38	29·04	7·51	29·01	7·64	30
31	30·08	7·50	30·05	7·63	30·01	7·76	29·98	7·89	31
32	31·05	7·74	31·02	7·88	30·98	8·01	30·95	8·15	32
33	32·02	7·98	31·98	8·12	31·95	8·26	31·91	8·40	33
34	32·99	8·23	32·95	8·37	32·92	8·51	32·88	8·66	34
35	33·96	8·47	33·92	8·62	33·89	8·76	33·85	8·91	35
36	34·93	8·71	34·89	8·86	34·85	9·01	34·81	9·17	36
37	35·90	8·95	35·86	9·11	35·82	9·26	35·78	9·42	37
38	36·87	9·19	36·83	9·35	36·79	9·51	36·75	9·67	38
39	37·84	9·44	37·80	9·60	37·76	9·76	37·71	9·93	39
40	38·81	9·68	38·77	9·85	38·73	10·02	38·68	10·18	40
41	39·78	9·92	39·74	10·09	39·69	10·27	39·65	10·44	41
42	40·75	10·16	40·71	10·34	40·66	10·52	40·62	10·69	42
43	41·72	10·40	41·68	10·58	41·63	10·77	41·58	10·95	43
44	42·69	10·64	42·65	10·83	42·60	11·02	42·55	11·20	44
45	43·66	10·89	43·62	11·08	43·57	11·27	43·52	11·46	45
46	44·63	11·13	44·58	11·32	44·53	11·52	44·48	11·71	46
47	45·60	11·37	45·55	11·57	45·50	11·77	45·45	11·97	47
48	46·57	11·61	46·52	11·82	46·47	12·02	46·42	12·22	48
49	47·54	11·85	47·49	12·06	47·44	12·27	47·39	12·48	49
50	48·51	12·10	48·46	12·31	48·41	12·52	48·35	12·73	50
Distance.	76 DEG.		75¾ DEG.		75½ DEG.		75¼ DEG.		Distance.
	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	

Distance.	14 DEG.		14½ DEG.		14½ DEG.		14¾ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	49-49	12-34	49-43	12-55	49-38	12-77	49-32	12-98	51
52	50-46	12-58	50-40	12-80	50-34	13-02	50-29	13-24	52
53	51-43	12-82	51-37	13-05	51-31	13-27	51-25	13-49	53
54	52-40	13-06	52-34	13-29	52-28	13-52	52-22	13-75	54
55	53-37	13-31	53-31	13-54	53-25	13-77	53-19	14-00	55
56	54-34	13-55	54-28	13-78	54-22	14-02	54-15	14-26	56
57	55-31	13-79	55-25	14-03	55-18	14-27	55-12	14-51	57
58	56-28	14-03	56-22	14-28	56-15	14-52	56-09	14-77	58
59	57-25	14-27	57-18	14-52	57-12	14-77	57-06	15-02	59
60	58-22	14-52	58-15	14-77	58-09	15-02	58-02	15-28	60
61	59-19	14-76	59-12	15-02	59-06	15-27	58-99	15-53	61
62	60-16	15-00	60-09	15-26	60-03	15-52	59-96	15-79	62
63	61-13	15-24	61-06	15-51	60-99	15-77	60-92	16-04	63
64	62-10	15-48	62-03	15-75	61-96	16-02	61-89	16-29	64
65	63-07	15-72	63-00	16-00	62-93	16-27	62-86	16-55	65
66	64-04	15-97	63-97	16-25	63-90	16-53	63-83	16-80	66
67	65-01	16-21	64-94	16-49	64-87	16-78	64-79	17-06	67
68	65-98	16-45	65-91	16-74	65-83	17-03	65-76	17-31	68
69	66-95	16-69	66-88	16-98	66-80	17-28	66-73	17-57	69
70	67-92	16-93	67-85	17-23	67-77	17-53	67-69	17-82	70
71	68-89	17-18	68-82	17-48	68-74	17-78	68-66	18-08	71
72	69-86	17-42	69-78	17-72	69-71	18-03	69-63	18-33	72
73	70-83	17-66	70-75	17-97	70-67	18-28	70-59	18-59	73
74	71-80	17-90	71-72	18-22	71-64	18-53	71-56	18-84	74
75	72-77	18-14	72-69	18-46	72-61	18-78	72-53	19-10	75
76	73-74	18-39	73-66	18-71	73-58	19-03	73-50	19-35	76
77	74-71	18-63	74-63	18-95	74-55	19-28	74-46	19-60	77
78	75-68	18-87	75-60	19-20	75-52	19-53	75-43	19-86	78
79	76-65	19-11	76-57	19-45	76-48	19-78	76-40	20-11	79
80	77-62	19-35	77-54	19-69	77-45	20-03	77-36	20-37	80
81	78-59	19-60	78-51	19-94	78-42	20-28	78-33	20-62	81
82	79-56	19-84	79-48	20-18	79-39	20-53	79-30	20-88	82
83	80-53	20-08	80-45	20-43	80-36	20-78	80-26	21-13	83
84	81-50	20-32	81-42	20-68	81-32	21-03	81-23	21-39	84
85	82-48	20-56	82-38	20-92	82-29	21-28	82-20	21-64	85
86	83-45	20-81	83-35	21-17	83-26	21-53	83-17	21-90	86
87	84-42	21-05	84-32	21-42	84-23	21-78	84-13	22-15	87
88	85-39	21-29	85-29	21-66	85-20	22-03	85-10	22-41	88
89	86-36	21-53	86-26	21-91	86-17	22-28	86-07	22-66	89
90	87-33	21-77	87-23	22-15	87-13	22-53	87-03	22-91	90
91	88-30	22-01	88-20	22-40	88-10	22-78	88-00	23-17	91
92	89-27	22-26	89-17	22-65	89-07	23-04	88-97	23-42	92
93	90-24	22-50	90-14	22-89	90-04	23-29	89-94	23-68	93
94	91-21	22-74	91-11	23-14	91-01	23-54	90-90	23-93	94
95	92-18	22-98	92-08	23-38	91-97	23-79	91-87	24-19	95
96	93-15	23-22	93-05	23-63	92-94	24-04	92-84	24-44	96
97	94-12	23-47	94-02	23-88	93-91	24-29	93-80	24-70	97
98	95-09	23-71	94-98	24-12	94-88	24-54	94-77	24-95	98
99	96-06	23-95	95-95	24-37	95-85	24-79	95-74	25-21	99
100	97-03	24-19	96-92	24-62	96-81	25-04	96-70	25-46	100
Distance.	76 DEG.		75¾ DEG.		75½ DEG.		75¼ DEG.		Distance.
	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	

Distance.	15 DEG.		15 $\frac{1}{4}$ DEG.		15 $\frac{1}{2}$ DEG.		15 $\frac{3}{4}$ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	0-97	0-26	0-96	0-26	0-96	0-27	0-96	0-27	1
2	1-93	0-52	1-93	0-53	1-93	0-53	1-92	0-54	2
3	2-90	0-78	2-89	0-79	2-89	0-80	2-89	0-81	3
4	3-86	1-04	3-86	1-05	3-85	1-07	3-85	1-09	4
5	4-83	1-29	4-82	1-32	4-82	1-34	4-81	1-36	5
6	5-80	1-55	5-79	1-58	5-78	1-60	5-77	1-63	6
7	6-76	1-81	6-75	1-84	6-75	1-87	6-74	1-90	7
8	7-73	2-07	7-72	2-10	7-71	2-14	7-70	2-17	8
9	8-69	2-33	8-68	2-37	8-67	2-41	8-66	2-44	9
10	9-66	2-59	9-65	2-63	9-64	2-67	9-62	2-71	10
11	10-63	2-85	10-61	2-89	10-60	2-94	10-59	2-99	11
12	11-59	3-11	11-58	3-16	11-56	3-21	11-55	3-26	12
13	12-56	3-36	12-54	3-42	12-53	3-47	12-51	3-53	13
14	13-52	3-62	13-51	3-68	13-49	3-74	13-47	3-80	14
15	14-49	3-88	14-47	3-95	14-45	4-01	14-44	4-07	15
16	15-45	4-14	15-44	4-21	15-42	4-28	15-40	4-34	16
17	16-42	4-40	16-40	4-47	16-38	4-54	16-36	4-61	17
18	17-39	4-66	17-37	4-73	17-35	4-81	17-32	4-89	18
19	18-35	4-92	18-33	5-00	18-31	5-08	18-29	5-16	19
20	19-32	5-18	19-30	5-26	19-27	5-34	19-25	5-43	20
21	20-28	5-44	20-26	5-52	20-24	5-61	20-21	5-70	21
22	21-25	5-69	21-23	5-79	21-20	5-88	21-17	5-97	22
23	22-22	5-95	22-19	6-05	22-16	6-15	22-14	6-24	23
24	23-18	6-21	23-15	6-31	23-13	6-41	23-10	6-51	24
25	24-15	6-47	24-12	6-58	24-09	6-68	24-06	6-79	25
26	25-11	6-73	25-08	6-84	25-05	6-95	25-02	7-06	26
27	26-08	6-99	26-05	7-10	26-02	7-22	25-99	7-33	27
28	27-05	7-25	27-01	7-36	26-98	7-48	26-95	7-60	28
29	28-01	7-51	27-98	7-63	27-95	7-75	27-91	7-87	29
30	28-98	7-76	28-94	7-89	28-91	8-02	28-87	8-14	30
31	29-94	8-02	29-91	8-15	29-87	8-28	29-84	8-41	31
32	30-91	8-28	30-87	8-42	30-84	8-55	30-80	8-69	32
33	31-88	8-54	31-84	8-68	31-80	8-82	31-76	8-96	33
34	32-84	8-80	32-80	8-94	32-76	9-09	32-72	9-23	34
35	33-81	9-06	33-77	9-21	33-73	9-35	33-69	9-50	35
36	34-77	9-32	34-73	9-47	34-69	9-62	34-65	9-77	36
37	35-74	9-58	35-70	9-73	35-65	9-89	35-61	10-04	37
38	36-71	9-84	36-66	10-00	36-62	10-16	36-57	10-31	38
39	37-67	10-09	37-63	10-26	37-58	10-42	37-54	10-59	39
40	38-64	10-35	38-59	10-52	38-55	10-69	38-50	10-86	40
41	39-60	10-61	39-56	10-78	39-51	10-96	39-46	11-13	41
42	40-57	10-87	40-52	11-05	40-47	11-22	40-42	11-40	42
43	41-53	11-13	41-49	11-31	41-44	11-49	41-39	11-67	43
44	42-50	11-39	42-45	11-57	42-40	11-76	42-35	11-94	44
45	43-47	11-65	43-42	11-84	43-36	12-03	43-31	12-21	45
46	44-43	11-91	44-38	12-10	44-33	12-29	44-27	12-49	46
47	45-40	12-16	45-35	12-36	45-29	12-56	45-24	12-76	47
48	46-36	12-42	46-31	12-63	46-25	12-83	46-20	13-03	48
49	47-33	12-68	47-27	12-89	47-22	13-09	47-16	13-30	49
50	48-30	12-94	48-24	13-15	48-18	13-36	48-12	13-57	50
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	75 DEG.		74 $\frac{1}{4}$ DEG.		74 $\frac{1}{2}$ DEG.		74 $\frac{3}{4}$ DEG.		

Distance.	15 DEG.		15½ DEG.		15¾ DEG.		15⅞ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	49-26	13-20	49-20	13-41	49-15	13-63	49-09	13-84	51
52	50-23	13-46	50-17	13-68	50-11	13-90	50-05	14-11	52
53	51-19	13-72	51-13	13-94	51-07	14-16	51-01	14-39	53
54	52-16	13-98	52-10	14-20	52-04	14-43	51-97	14-66	54
55	53-13	14-24	53-06	14-47	53-00	14-70	52-94	14-93	55
56	54-09	14-49	54-03	14-73	53-96	14-97	53-90	15-20	56
57	55-06	14-75	54-99	14-99	54-93	15-23	54-86	15-47	57
58	56-02	15-01	55-96	15-26	55-89	15-50	55-82	15-74	58
59	56-99	15-27	56-92	15-52	56-85	15-77	56-78	16-01	59
60	57-96	15-53	57-89	15-78	57-82	16-03	57-75	16-29	60
61	58-92	15-79	58-85	16-04	58-78	16-30	58-71	16-56	61
62	59-89	16-05	59-82	16-31	59-75	16-57	59-67	16-83	62
63	60-85	16-31	60-78	16-57	60-71	16-84	60-63	17-10	63
64	61-82	16-56	61-75	16-83	61-67	17-10	61-60	17-37	64
65	62-79	16-82	62-71	17-10	62-64	17-37	62-56	17-64	65
66	63-75	17-08	63-68	17-36	63-60	17-64	63-52	17-92	66
67	64-72	17-34	64-64	17-62	64-56	17-90	64-48	18-19	67
68	65-68	17-60	65-61	17-89	65-53	18-17	65-45	18-46	68
69	66-65	17-86	66-57	18-15	66-49	18-44	66-41	18-73	69
70	67-61	18-12	67-54	18-41	67-45	18-71	67-37	19-00	70
71	68-58	18-38	68-50	18-68	68-42	18-97	68-33	19-27	71
72	69-55	18-63	69-46	18-94	69-38	19-24	69-30	19-54	72
73	70-51	18-89	70-43	19-20	70-35	19-51	70-26	19-82	73
74	71-48	19-15	71-39	19-46	71-31	19-78	71-22	20-09	74
75	72-44	19-41	72-36	19-73	72-27	20-04	72-18	20-36	75
76	73-41	19-67	73-32	19-99	73-24	20-31	73-15	20-63	76
77	74-38	19-93	74-29	20-25	74-20	20-58	74-11	20-90	77
78	75-34	20-19	75-25	20-52	75-16	20-84	75-07	21-17	78
79	76-31	20-45	76-22	20-78	76-13	21-11	76-03	21-44	79
80	77-27	20-71	77-18	21-04	77-09	21-38	77-00	21-72	80
81	78-24	20-96	78-15	21-31	78-05	21-65	77-96	21-99	81
82	79-21	21-22	79-11	21-57	79-02	21-91	78-92	22-26	82
83	80-17	21-48	80-08	21-83	79-98	22-18	79-88	22-53	83
84	81-14	21-74	81-04	22-09	80-94	22-45	80-85	22-80	84
85	82-10	22-60	82-01	22-36	81-91	22-72	81-81	23-07	85
86	83-07	22-26	82-97	22-62	82-87	22-98	82-77	23-34	86
87	84-04	22-52	83-94	22-88	83-84	23-25	83-73	23-62	87
88	85-00	22-78	84-90	23-15	84-80	23-52	84-70	23-89	88
89	85-97	23-03	85-87	23-41	85-76	23-78	85-66	24-16	89
90	86-93	23-29	86-83	23-67	86-73	24-05	86-62	24-43	90
91	87-90	23-55	87-80	23-94	87-69	24-32	87-58	24-70	91
92	88-87	23-81	88-76	24-20	88-65	24-59	88-55	24-97	92
93	89-83	24-07	89-73	24-46	89-62	24-85	89-51	25-24	93
94	90-80	24-33	90-69	24-72	90-58	25-12	90-47	25-52	94
95	91-76	24-59	91-65	24-99	91-54	25-39	91-43	25-79	95
96	92-73	24-85	92-62	25-25	92-51	25-65	92-40	26-06	96
97	93-69	25-11	93-58	25-51	93-47	25-92	93-36	26-33	97
98	94-66	25-36	94-55	25-78	94-44	26-19	94-32	26-60	98
99	95-63	25-62	95-51	26-04	95-40	26-46	95-28	26-87	99
100	96-59	25-88	96-48	26-30	96-36	26-72	96-25	27-14	100
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	75 DEG.		74¾ DEG.		74½ DEG.		74¼ DEG.		

Distance.	16 DEG.		16½ DEG.		16¾ DEG.		16¾ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	0-96	0-28	0-96	0-28	0-96	0-28	0-96	0-29	1
2	1-92	0-55	1-92	0-56	1-92	0-57	1-92	0-58	2
3	2-88	0-83	2-88	0-84	2-88	0-85	2-87	0-86	3
4	3-85	1-10	3-84	1-12	3-84	1-14	3-83	1-15	4
5	4-81	1-38	4-80	1-40	4-79	1-42	4-79	1-44	5
6	5-77	1-65	5-76	1-68	5-75	1-70	5-75	1-73	6
7	6-73	1-93	6-72	1-96	6-71	1-99	6-70	2-02	7
8	7-69	2-21	7-68	2-24	7-67	2-27	7-66	2-31	8
9	8-65	2-48	8-64	2-52	8-63	2-56	8-62	2-59	9
10	9-61	2-76	9-60	2-80	9-59	2-84	9-58	2-88	10
11	10-57	3-03	10-56	3-06	10-55	3-12	10-53	3-17	11
12	11-54	3-31	11-52	3-36	11-51	3-41	11-49	3-46	12
13	12-50	3-58	12-48	3-64	12-46	3-69	12-45	3-75	13
14	13-46	3-86	13-44	3-92	13-42	3-98	13-41	4-03	14
15	14-42	4-13	14-40	4-20	14-38	4-26	14-36	4-32	15
16	15-38	4-41	15-36	4-48	15-34	4-54	15-32	4-61	16
17	16-34	4-69	16-32	4-76	16-30	4-83	16-28	4-90	17
18	17-30	4-96	17-28	5-04	17-26	5-11	17-24	5-19	18
19	18-26	5-24	18-24	5-32	18-22	5-40	18-19	5-48	19
20	19-23	5-51	19-20	5-60	19-18	5-68	19-15	5-76	20
21	20-19	5-79	20-16	5-88	20-14	5-96	20-11	6-05	21
22	21-15	6-06	21-12	6-16	21-09	6-25	21-07	6-34	22
23	22-11	6-34	22-08	6-44	22-05	6-53	22-02	6-63	23
24	23-07	6-62	23-04	6-72	23-01	6-82	22-98	6-92	24
25	24-03	6-89	24-00	7-00	23-97	7-10	23-94	7-20	25
26	24-99	7-17	24-96	7-28	24-93	7-38	24-90	7-49	26
27	25-95	7-44	25-92	7-56	25-89	7-67	25-85	7-78	27
28	26-92	7-72	26-88	7-84	26-85	7-95	26-81	8-07	28
29	27-88	7-99	27-84	8-11	27-81	8-24	27-77	8-36	29
30	28-84	8-27	28-80	8-39	28-76	8-52	28-73	8-65	30
31	29-80	8-54	29-76	8-67	29-72	8-80	29-68	8-93	31
32	30-76	8-82	30-72	8-95	30-68	9-09	30-64	9-22	32
33	31-72	9-10	31-68	9-23	31-64	9-37	31-60	9-51	33
34	32-68	9-37	32-64	9-51	32-60	9-66	32-56	9-80	34
35	33-64	9-65	33-60	9-79	33-56	9-94	33-51	10-09	35
36	34-61	9-92	34-56	10-07	34-52	10-22	34-47	10-38	36
37	35-57	10-20	35-52	10-35	35-48	10-51	35-43	10-66	37
38	36-53	10-47	36-48	10-63	36-44	10-79	36-39	10-95	38
39	37-49	10-75	37-44	10-91	37-39	11-08	37-35	11-24	39
40	38-45	11-03	38-40	11-19	38-35	11-36	38-30	11-53	40
41	39-41	11-30	39-36	11-47	39-31	11-64	39-26	11-82	41
42	40-37	11-58	40-32	11-75	40-27	11-93	40-22	12-10	42
43	41-33	11-85	41-28	12-03	41-23	12-21	41-18	12-39	43
44	42-30	12-13	42-24	12-31	42-19	12-50	42-13	12-68	44
45	43-26	12-40	43-20	12-59	43-15	12-78	43-09	12-97	45
46	44-22	12-68	44-16	12-87	44-11	13-06	44-05	13-26	46
47	45-18	12-95	45-12	13-15	45-06	13-35	45-01	13-55	47
48	46-14	13-23	46-08	13-43	46-02	13-63	45-96	13-83	48
49	47-10	13-51	47-04	13-71	46-98	13-92	46-92	14-12	49
50	48-06	13-78	48-00	13-99	47-94	14-20	47-88	14-41	50
Distance.	74 DEG.		73¾ DEG.		73½ DEG.		73¼ DEG.		Distance.
	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	

Distance.	16 DEG.		16 $\frac{1}{2}$ DEG.		16 $\frac{1}{2}$ DEG.		16 $\frac{1}{2}$ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	49-02	14-06	48-96	14-27	48-90	14-48	48-84	14-70	51
52	49-99	14-33	49-92	14-55	49-86	14-77	49-79	14-99	52
53	50-95	14-61	50-88	14-83	50-82	15-05	50-75	15-27	53
54	51-91	14-88	51-84	15-11	51-78	15-34	51-71	15-56	54
55	52-87	15-16	52-80	15-39	52-74	15-62	52-67	15-85	55
56	53-83	15-44	53-76	15-67	53-69	15-90	53-62	16-14	56
57	54-79	15-71	54-72	15-95	54-65	16-19	54-58	16-43	57
58	55-75	15-99	55-68	16-23	55-61	16-47	55-54	16-72	58
59	56-71	16-26	56-64	16-51	56-57	16-76	56-50	17-00	59
60	57-68	16-54	57-60	16-79	57-53	17-04	57-45	17-29	60
61	58-64	16-81	58-56	17-07	58-49	17-32	58-41	17-58	61
62	59-60	17-09	59-52	17-35	59-45	17-61	59-37	17-87	62
63	60-56	17-37	60-48	17-63	60-41	17-89	60-33	18-16	63
64	61-52	17-64	61-44	17-91	61-36	18-18	61-28	18-44	64
65	62-48	17-92	62-40	18-19	62-32	18-46	62-24	18-73	65
66	63-44	18-19	63-36	18-47	63-28	18-74	63-20	19-02	66
67	64-40	18-47	64-32	18-75	64-24	19-03	64-16	19-31	67
68	65-37	18-74	65-29	19-03	65-20	19-31	65-11	19-60	68
69	66-33	19-02	66-24	19-31	66-16	19-60	66-07	19-89	69
70	67-29	19-29	67-20	19-59	67-12	19-88	67-03	20-17	70
71	68-25	19-57	68-16	19-87	68-08	20-17	67-99	20-46	71
72	69-21	19-85	69-12	20-15	69-03	20-45	68-95	20-75	72
73	70-17	20-12	70-08	20-43	69-99	20-73	69-90	21-04	73
74	71-13	20-40	71-04	20-71	70-95	21-02	70-86	21-33	74
75	72-09	20-67	72-00	20-99	71-91	21-30	71-82	21-61	75
76	73-06	20-95	72-96	21-27	72-87	21-59	72-78	21-90	76
77	74-02	21-22	73-92	21-55	73-83	21-87	73-73	22-19	77
78	74-98	21-50	74-88	21-83	74-79	22-15	74-69	22-48	78
79	75-94	21-78	75-84	22-11	75-75	22-44	75-65	22-77	79
80	76-90	22-05	76-80	22-39	76-71	22-72	76-61	23-06	80
81	77-86	22-33	77-76	22-67	77-66	23-01	77-56	23-34	81
82	78-82	22-60	78-72	22-95	78-62	23-29	78-52	23-63	82
83	79-78	22-88	79-68	23-23	79-58	23-57	79-48	23-92	83
84	80-75	23-15	80-64	23-51	80-54	23-86	80-44	24-21	84
85	81-71	23-43	81-60	23-79	81-50	24-14	81-39	24-50	85
86	82-67	23-70	82-56	24-07	82-46	24-43	82-35	24-78	86
87	83-63	23-98	83-52	24-35	83-42	24-71	83-31	25-07	87
88	84-59	24-26	84-48	24-62	84-38	24-99	84-27	25-36	88
89	85-55	24-53	85-44	24-90	85-33	25-28	85-22	25-65	89
90	86-51	24-81	86-40	25-18	86-29	25-56	86-18	25-94	90
91	87-47	25-08	87-36	25-46	87-25	25-85	87-14	26-23	91
92	88-44	25-36	88-32	25-74	88-21	26-13	88-10	26-51	92
93	89-40	25-63	89-28	26-02	89-17	26-41	89-05	26-80	93
94	90-36	25-91	90-24	26-30	90-13	26-70	90-01	27-09	94
95	91-32	26-19	91-20	26-58	91-09	26-98	90-97	27-38	95
96	92-28	26-46	92-16	26-86	92-05	27-27	91-93	27-67	96
97	93-24	26-74	93-12	27-14	93-01	27-55	92-88	27-95	97
98	94-20	27-01	94-08	27-42	93-96	27-83	93-84	28-24	98
99	95-16	27-29	95-04	27-70	94-92	28-12	94-80	28-53	99
100	96-13	27-56	96-00	27-98	95-88	28-40	95-76	28-82	100
Distance.	74 DEG.		73 $\frac{1}{2}$ DEG.		73 $\frac{1}{2}$ DEG.		73 $\frac{1}{2}$ DEG.		Distance.
	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	

Distance.	17 DEG.		17 $\frac{1}{2}$ DEG.		17 $\frac{1}{2}$ DEG.		17 $\frac{1}{2}$ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	0-96	0-29	0-95	0-30	0-95	0-30	0-95	0-30	1
2	1-91	0-58	1-91	0-59	1-91	0-60	1-90	0-61	2
3	2-87	0-88	2-87	0-89	2-86	0-90	2-86	0-91	3
4	3-83	1-17	3-82	1-19	3-81	1-20	3-81	1-22	4
5	4-78	1-46	4-78	1-48	4-77	1-50	4-76	1-52	5
6	5-74	1-75	5-73	1-78	5-72	1-80	5-71	1-83	6
7	6-69	2-05	6-69	2-08	6-68	2-10	6-67	2-13	7
8	7-65	2-34	7-64	2-37	7-63	2-41	7-62	2-44	8
9	8-61	2-63	8-60	2-67	8-58	2-71	8-57	2-74	9
10	9-56	2-92	9-55	2-97	9-54	3-01	9-52	3-05	10
11	10-52	3-22	10-51	3-26	10-49	3-31	10-48	3-35	11
12	11-48	3-51	11-46	3-56	11-44	3-61	11-43	3-66	12
13	12-43	3-80	12-42	3-85	12-40	3-91	12-38	3-96	13
14	13-39	4-09	13-37	4-15	13-35	4-21	13-33	4-27	14
15	14-34	4-39	14-33	4-45	14-31	4-51	14-29	4-57	15
16	15-30	4-68	15-28	4-74	15-26	4-81	15-24	4-88	16
17	16-26	4-97	16-24	5-04	16-21	5-11	16-19	5-18	17
18	17-21	5-26	17-19	5-34	17-17	5-41	17-14	5-49	18
19	18-17	5-56	18-15	5-63	18-12	5-71	18-10	5-79	19
20	19-13	5-85	19-10	5-93	19-07	6-01	19-05	6-10	20
21	20-08	6-14	20-06	6-23	20-03	6-31	20-00	6-40	21
22	21-04	6-43	21-01	6-52	20-98	6-62	20-95	6-71	22
23	21-99	6-72	21-97	6-82	21-94	6-92	21-91	7-01	23
24	22-95	7-02	22-92	7-12	22-89	7-22	22-86	7-32	24
25	23-91	7-31	23-88	7-41	23-84	7-52	23-81	7-62	25
26	24-86	7-60	24-83	7-71	24-80	7-82	24-76	7-93	26
27	25-82	7-89	25-79	8-01	25-75	8-12	25-71	8-23	27
28	26-78	8-19	26-74	8-30	25-70	8-42	26-67	8-54	28
29	27-73	8-48	27-70	8-60	27-66	8-72	27-62	8-84	29
30	28-69	8-77	28-65	8-90	28-61	9-02	28-57	9-15	30
31	29-65	9-06	29-61	9-19	29-57	9-32	29-52	9-45	31
32	30-60	9-36	30-56	9-49	30-52	9-62	30-48	9-76	32
33	31-56	9-65	31-52	9-79	31-47	9-92	31-43	10-06	33
34	32-51	9-94	32-47	10-08	32-43	10-22	32-38	10-37	34
35	33-47	10-23	33-43	10-38	33-38	10-52	33-33	10-67	35
36	34-43	10-53	34-38	10-68	34-33	10-83	34-29	10-98	36
37	35-38	10-82	35-34	10-97	35-29	11-13	35-24	11-28	37
38	36-34	11-11	36-29	11-27	36-24	11-43	36-19	11-58	38
39	37-30	11-40	37-25	11-57	37-19	11-73	37-14	11-89	39
40	38-25	11-69	38-20	11-86	38-15	12-03	38-10	12-19	40
41	39-21	11-99	39-16	12-16	39-10	12-33	39-05	12-50	41
42	40-16	12-28	40-11	12-45	40-06	12-63	40-00	12-80	42
43	41-12	12-57	41-07	12-75	41-01	12-93	40-95	13-11	43
44	42-08	12-86	42-02	13-05	41-96	13-23	41-91	13-41	44
45	43-03	13-16	42-98	13-34	42-92	13-53	42-86	13-72	45
46	43-99	13-45	43-93	13-64	43-87	13-83	43-81	14-02	46
47	44-95	13-74	44-89	13-94	44-82	14-13	44-76	14-33	47
48	45-90	14-03	45-84	14-23	45-78	14-43	45-71	14-63	48
49	46-86	14-33	46-80	14-53	46-73	14-73	46-67	14-94	49
50	47-82	14-62	47-75	14-83	47-69	15-04	47-62	15-24	50
Distance.	73 DEG.		72 $\frac{1}{2}$ DEG.		72 $\frac{1}{2}$ DEG.		72 $\frac{1}{2}$ DEG.		Distance.
	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	

Distance.	17 DEG.		17½ DEG.		17½ DEG.		17¾ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	48° 77'	14° 91'	48° 71'	15° 12'	48° 64'	15° 34'	48° 57'	15° 55'	51
52	49° 73'	15° 20'	49° 66'	15° 42'	49° 59'	15° 64'	49° 52'	15° 85'	52
53	50° 68'	15° 50'	50° 62'	15° 72'	50° 55'	15° 94'	50° 48'	15° 16'	53
54	51° 64'	15° 79'	51° 57'	16° 01'	51° 50'	16° 24'	51° 43'	16° 46'	54
55	52° 60'	16° 08'	52° 53'	16° 31'	52° 45'	16° 54'	52° 38'	16° 77'	55
56	53° 55'	16° 37'	53° 48'	16° 61'	53° 41'	16° 84'	53° 33'	17° 07'	56
57	54° 51'	16° 67'	54° 44'	16° 90'	54° 36'	17° 14'	54° 29'	17° 38'	57
58	55° 47'	16° 96'	55° 39'	17° 20'	55° 32'	17° 44'	55° 24'	17° 68'	58
59	56° 42'	17° 25'	56° 35'	17° 50'	56° 27'	17° 74'	56° 10'	17° 99'	59
60	57° 38'	17° 54'	57° 30'	17° 79'	57° 22'	18° 04'	57° 14'	18° 29'	60
61	58° 33'	17° 83'	58° 26'	18° 09'	58° 18'	18° 34'	58° 10'	18° 60'	61
62	59° 29'	18° 13'	59° 21'	18° 39'	59° 13'	18° 64'	59° 05'	18° 90'	62
63	60° 25'	18° 42'	60° 17'	18° 63'	60° 08'	18° 94'	60° 00'	19° 21'	63
64	61° 20'	18° 71'	61° 12'	18° 93'	61° 04'	19° 25'	60° 95'	19° 51'	64
65	62° 16'	19° 00'	62° 08'	19° 23'	61° 99'	19° 55'	61° 91'	19° 82'	65
66	63° 12'	19° 30'	63° 03'	19° 57'	62° 95'	19° 85'	62° 86'	20° 12'	66
67	64° 07'	19° 59'	63° 99'	19° 87'	63° 90'	20° 15'	63° 81'	20° 43'	67
68	65° 03'	19° 88'	64° 94'	20° 16'	64° 85'	20° 45'	64° 76'	20° 73'	68
69	65° 99'	20° 17'	65° 90'	20° 46'	65° 81'	20° 75'	65° 72'	21° 04'	69
70	66° 94'	20° 47'	66° 85'	20° 75'	66° 76'	21° 05'	66° 67'	21° 34'	70
71	67° 90'	20° 76'	67° 81'	21° 05'	67° 71'	21° 35'	67° 62'	21° 65'	71
72	68° 85'	21° 05'	68° 76'	21° 35'	68° 67'	21° 65'	68° 57'	21° 95'	72
73	69° 81'	21° 34'	69° 72'	21° 65'	69° 62'	21° 95'	69° 52'	22° 26'	73
74	70° 77'	21° 64'	70° 67'	21° 94'	70° 58'	22° 25'	70° 48'	22° 56'	74
75	71° 72'	21° 93'	71° 63'	22° 24'	71° 53'	22° 55'	71° 43'	22° 86'	75
76	72° 68'	22° 22'	72° 58'	22° 54'	72° 48'	22° 85'	72° 38'	23° 17'	76
77	73° 64'	22° 51'	73° 54'	22° 83'	73° 44'	23° 15'	73° 33'	23° 47'	77
78	74° 59'	22° 80'	74° 49'	23° 13'	74° 39'	23° 46'	74° 29'	23° 78'	78
79	75° 55'	23° 10'	75° 45'	23° 43'	75° 34'	23° 76'	75° 24'	24° 08'	79
80	76° 50'	23° 39'	76° 40'	23° 72'	76° 30'	24° 06'	76° 19'	24° 39'	80
81	77° 46'	23° 68'	77° 36'	24° 02'	77° 25'	24° 36'	77° 14'	24° 69'	81
82	78° 42'	23° 97'	78° 31'	24° 32'	78° 20'	24° 66'	78° 10'	25° 00'	82
83	79° 37'	24° 27'	79° 27'	24° 61'	79° 16'	25° 96'	79° 05'	25° 30'	83
84	80° 33'	24° 56'	80° 22'	24° 91'	80° 11'	25° 26'	80° 00'	25° 61'	84
85	81° 29'	24° 85'	81° 18'	25° 21'	81° 07'	25° 56'	80° 95'	25° 91'	85
86	82° 24'	25° 14'	82° 13'	25° 50'	82° 02'	25° 86'	81° 91'	26° 22'	86
87	83° 20'	25° 44'	83° 09'	25° 80'	82° 97'	26° 16'	82° 86'	26° 52'	87
88	84° 15'	25° 73'	84° 04'	26° 10'	83° 93'	26° 46'	83° 81'	26° 83'	88
89	85° 11'	26° 02'	85° 00'	26° 39'	84° 88'	26° 76'	84° 76'	27° 13'	89
90	86° 07'	26° 31'	85° 95'	26° 69'	85° 83'	27° 06'	85° 72'	27° 44'	90
91	87° 02'	26° 61'	86° 91'	26° 99'	86° 79'	27° 36'	86° 67'	27° 74'	91
92	87° 98'	26° 90'	87° 86'	27° 28'	87° 74'	27° 66'	87° 62'	28° 05'	92
93	88° 94'	27° 19'	88° 82'	27° 58'	88° 70'	27° 97'	88° 57'	28° 35'	93
94	89° 89'	27° 48'	89° 77'	27° 87'	89° 65'	28° 27'	89° 53'	28° 66'	94
95	90° 85'	27° 78'	90° 73'	28° 17'	90° 60'	28° 57'	90° 48'	28° 96'	95
96	91° 81'	28° 07'	91° 68'	28° 47'	91° 56'	28° 87'	91° 43'	29° 27'	96
97	92° 76'	28° 36'	92° 64'	28° 76'	92° 51'	29° 17'	92° 38'	29° 57'	97
98	93° 72'	28° 65'	93° 59'	29° 06'	93° 46'	29° 47'	93° 33'	29° 88'	98
99	94° 67'	28° 94'	94° 55'	29° 36'	94° 42'	29° 77'	94° 29'	30° 18'	99
100	95° 63'	29° 24'	95° 50'	29° 65'	95° 37'	30° 07'	95° 24'	30° 49'	100
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	73 DEG.		72½ DEG.		72½ DEG.		72¼ DEG.		

Distance.	18 DEG.		18½ DEG.		18¾ DEG.		18¾ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	0-95	0-31	0-95	0-31	0-95	0-32	0-95	0-32	1
2	1-90	0-62	1-90	0-63	1-90	0-63	1-89	0-64	2
3	2-85	0-93	2-85	0-94	2-84	0-95	2-84	0-96	3
4	3-80	1-24	3-80	1-25	3-79	1-27	3-79	1-29	4
5	4-76	1-55	4-75	1-57	4-74	1-59	4-73	1-61	5
6	5-71	1-85	5-70	1-88	5-69	1-90	5-68	1-93	6
7	6-66	2-16	6-65	2-19	6-64	2-22	6-63	2-25	7
8	7-61	2-47	7-60	2-51	7-59	2-54	7-58	2-57	8
9	8-56	2-78	8-55	2-82	8-53	2-86	8-52	2-89	9
10	9-51	3-09	9-50	3-13	9-48	3-17	9-47	3-21	10
11	10-46	3-40	10-45	3-44	10-43	3-49	10-42	3-54	11
12	11-41	3-71	11-40	3-76	11-38	3-81	11-36	3-86	12
13	12-36	4-02	12-35	4-07	12-33	4-12	12-31	4-18	13
14	13-31	4-33	13-30	4-38	13-28	4-44	13-26	4-50	14
15	14-27	4-64	14-25	4-70	14-22	4-76	14-20	4-82	15
16	15-22	4-94	15-20	5-01	15-17	5-08	15-15	5-14	16
17	16-17	5-25	16-14	5-32	16-12	5-39	16-10	5-46	17
18	17-12	5-56	17-09	5-64	17-07	5-71	17-04	5-79	18
19	18-07	5-87	18-04	5-95	18-02	6-03	17-99	6-11	19
20	19-02	6-18	18-99	6-26	18-97	6-35	18-94	6-43	20
21	19-97	6-49	19-94	6-58	19-91	6-66	19-89	6-75	21
22	20-92	6-80	20-89	6-89	20-86	6-98	20-83	7-07	22
23	21-87	7-11	21-84	7-20	21-81	7-30	21-78	7-39	23
24	22-83	7-42	22-79	7-52	22-76	7-62	22-73	7-71	24
25	23-78	7-73	23-74	7-83	23-71	7-93	23-67	8-04	25
26	24-73	8-03	24-69	8-14	24-66	8-25	24-62	8-36	26
27	25-68	8-34	25-64	8-46	25-60	8-57	25-57	8-68	27
28	26-63	8-65	26-59	8-77	26-55	8-88	26-51	9-00	28
29	27-58	8-96	27-54	9-08	27-50	9-20	27-46	9-32	29
30	28-53	9-27	28-49	9-39	28-45	9-52	28-41	9-64	30
31	29-48	9-58	29-44	9-71	29-40	9-84	29-35	9-96	31
32	30-43	9-89	30-39	10-02	30-35	10-15	30-30	10-29	32
33	31-38	10-20	31-34	10-33	31-29	10-47	31-25	10-61	33
34	32-34	10-51	32-29	10-65	32-24	10-79	32-20	10-93	34
35	33-29	10-82	33-24	10-96	33-19	11-11	33-14	11-25	35
36	34-24	11-12	34-19	11-27	34-14	11-42	34-09	11-57	36
37	35-19	11-43	35-14	11-59	35-09	11-74	35-04	11-89	37
38	36-14	11-74	36-09	11-90	36-04	12-06	35-98	12-21	38
39	37-09	12-05	37-04	12-21	36-98	12-37	36-93	12-54	39
40	38-04	12-36	37-99	12-53	37-93	12-69	37-88	12-86	40
41	38-99	12-67	38-94	12-84	38-88	13-01	38-82	13-18	41
42	39-94	12-98	39-89	13-15	39-83	13-33	39-77	13-50	42
43	40-90	13-29	40-84	13-47	40-78	13-64	40-72	13-82	43
44	41-85	13-60	41-79	13-78	41-73	13-96	41-66	14-14	44
45	42-80	13-91	42-74	14-09	42-67	14-28	42-61	14-46	45
46	43-75	14-21	43-69	14-41	43-62	14-60	43-56	14-79	46
47	44-70	14-52	44-64	14-72	44-57	14-91	44-51	15-11	47
48	45-65	14-83	45-59	15-03	45-52	15-23	45-45	15-43	48
49	46-60	15-14	46-54	15-35	46-47	15-55	46-40	15-75	49
50	47-55	15-45	47-48	15-66	47-42	15-87	47-35	16-07	50
Distance.	72 DEG.		71½ DEG.		71¾ DEG.		71¾ DEG.		Distance.
	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	

Distance.	18 DEG.		18 $\frac{1}{4}$ DEG.		18 $\frac{1}{2}$ DEG.		18 $\frac{3}{4}$ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	48-50	15-76	48-43	15-97	48-36	16-18	48-29	16-39	51
52	49-45	16-07	49-38	16-28	49-31	16-50	49-24	16-71	52
53	50-41	16-38	50-33	16-60	50-26	16-82	50-19	17-04	53
54	51-36	16-69	51-28	16-91	51-21	17-13	51-13	17-36	54
55	52-31	17-00	52-23	17-22	52-16	17-45	52-08	17-68	55
56	53-26	17-30	53-18	17-54	53-11	17-77	53-03	18-00	56
57	54-21	17-61	54-13	17-85	54-05	18-09	53-98	18-32	57
58	55-16	17-92	55-08	18-16	55-00	18-40	54-92	18-64	58
59	56-11	18-23	56-03	18-48	55-95	18-72	55-87	18-96	59
60	57-06	18-54	56-98	18-79	56-90	19-04	56-82	19-29	60
61	58-01	18-85	57-93	19-10	57-85	19-36	57-76	19-61	61
62	58-97	19-16	58-88	19-42	58-80	19-67	58-71	19-93	62
63	59-92	19-47	59-83	19-73	59-74	19-99	59-66	20-25	63
64	60-87	19-78	60-78	20-04	60-69	20-31	60-60	20-57	64
65	61-82	20-09	61-73	20-36	61-64	20-62	61-55	20-89	65
66	62-77	20-40	62-68	20-67	62-59	20-94	62-50	21-22	66
67	63-72	20-70	63-63	20-98	63-54	21-26	63-44	21-54	67
68	64-67	21-01	64-58	21-30	64-49	21-58	64-39	21-86	68
69	65-62	21-32	65-53	21-61	65-43	21-89	65-34	22-18	69
70	66-57	21-63	66-48	21-92	66-38	22-21	66-29	22-50	70
71	67-53	21-94	67-43	22-23	67-33	22-53	67-23	22-82	71
72	68-48	22-25	68-38	22-55	68-28	22-85	68-18	23-14	72
73	69-43	22-56	69-33	22-86	69-23	23-16	69-13	23-47	73
74	70-38	22-87	70-28	23-17	70-18	23-48	70-07	23-79	74
75	71-33	23-18	71-23	23-49	71-12	23-80	71-02	24-11	75
76	72-28	23-49	72-18	23-80	72-07	24-12	71-97	24-43	76
77	73-23	23-79	73-13	24-11	73-02	24-43	72-91	24-75	77
78	74-18	24-10	74-08	24-43	73-97	24-75	73-86	25-07	78
79	75-13	24-41	75-03	24-74	74-92	25-07	74-81	25-39	79
80	76-08	24-72	75-98	25-05	75-87	25-38	75-75	25-72	80
81	77-04	25-03	76-93	25-37	76-81	25-70	76-70	26-04	81
82	77-99	25-34	77-88	25-68	77-76	26-02	77-65	26-36	82
83	78-94	25-65	78-83	25-99	78-71	26-34	78-60	26-68	83
84	79-89	25-96	79-77	26-31	79-66	26-65	79-54	27-00	84
85	80-84	26-27	80-72	26-62	80-61	26-97	80-49	27-32	85
86	81-79	26-58	81-67	26-93	81-56	27-29	81-44	27-64	86
87	82-74	26-88	82-62	27-25	82-50	27-61	82-38	27-97	87
88	83-69	27-19	83-57	27-56	83-45	27-92	83-33	28-29	88
89	84-64	27-50	84-52	27-87	84-40	28-24	84-28	28-61	89
90	85-60	27-81	85-47	28-18	85-35	28-56	85-22	28-93	90
91	86-55	28-12	86-42	28-50	86-30	28-87	86-17	29-25	91
92	87-50	28-43	87-37	28-81	87-25	29-19	87-12	29-57	92
93	88-45	28-74	88-32	29-12	88-19	29-51	88-06	29-89	93
94	89-40	29-05	89-27	29-44	89-14	29-83	89-01	30-22	94
95	90-35	29-36	90-22	29-75	90-09	30-14	89-96	30-54	95
96	91-30	29-67	91-17	30-06	91-04	30-46	90-91	30-86	96
97	92-25	29-97	92-12	30-38	91-99	30-78	91-85	31-18	97
98	93-20	30-28	93-07	30-69	92-94	31-10	92-80	31-50	98
99	94-15	30-59	94-02	31-00	93-88	31-41	93-75	31-82	99
100	95-11	30-90	94-97	31-32	94-83	31-73	94-69	32-14	100
Distance.	72 DEG.		71 $\frac{1}{4}$ DEG.		71 $\frac{1}{2}$ DEG.		71 $\frac{3}{4}$ DEG.		Distance.
	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	

Distance.	19 DEG.		19 $\frac{1}{4}$ DEG.		19 $\frac{1}{2}$ DEG.		19 $\frac{3}{4}$ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	0.95	0.33	0.94	0.33	0.94	0.33	0.94	0.34	1
2	1.89	0.65	1.89	0.66	1.89	0.67	1.88	0.68	2
3	2.84	0.98	2.83	0.99	2.83	1.00	2.82	1.01	3
4	3.78	1.30	3.78	1.32	3.77	1.34	3.76	1.35	4
5	4.73	1.63	4.72	1.65	4.71	1.67	4.71	1.69	5
6	5.67	1.95	5.66	1.98	5.66	2.00	5.65	2.03	6
7	6.62	2.28	6.61	2.31	6.60	2.34	6.59	2.37	7
8	7.56	2.60	7.55	2.64	7.54	2.67	7.53	2.70	8
9	8.51	2.93	8.50	2.97	8.48	3.00	8.47	3.04	9
10	9.46	3.26	9.44	3.30	9.43	3.34	9.41	3.38	10
11	10.40	3.58	10.38	3.63	10.37	3.67	10.35	3.72	11
12	11.35	3.91	11.33	3.96	11.31	4.01	11.29	4.06	12
13	12.29	4.23	12.27	4.29	12.25	4.34	12.24	4.39	13
14	13.24	4.56	13.22	4.62	13.20	4.67	13.18	4.73	14
15	14.18	4.88	14.16	4.95	14.14	5.01	14.12	5.07	15
16	15.13	5.21	15.11	5.28	15.08	5.34	15.06	5.41	16
17	16.07	5.53	16.05	5.60	16.02	5.67	16.00	5.74	17
18	17.02	5.86	16.99	5.93	16.97	6.01	16.94	6.08	18
19	17.96	6.19	17.94	6.25	17.91	6.34	17.88	6.42	19
20	18.91	6.51	18.88	6.59	18.85	6.68	18.82	6.76	20
21	19.86	6.84	19.83	6.92	19.80	7.01	19.76	7.10	21
22	20.80	7.16	20.77	7.25	20.74	7.34	20.71	7.43	22
23	21.75	7.49	21.71	7.58	21.68	7.68	21.65	7.77	23
24	22.69	7.81	22.66	7.91	22.62	8.01	22.59	8.11	24
25	23.64	8.14	23.60	8.24	23.57	8.35	23.53	8.45	25
26	24.58	8.46	24.55	8.57	24.51	8.68	24.47	8.79	26
27	25.53	8.79	25.49	8.90	25.45	9.01	25.41	9.12	27
28	26.47	9.12	26.43	9.23	26.39	9.35	26.35	9.46	28
29	27.42	9.44	27.38	9.56	27.34	9.68	27.29	9.80	29
30	28.37	9.77	28.32	9.89	28.28	10.01	28.24	10.14	30
31	29.31	10.09	29.27	10.22	29.22	10.35	29.18	10.48	31
32	30.26	10.42	30.21	10.55	30.16	10.68	30.12	10.81	32
33	31.20	10.74	31.15	10.88	31.11	11.02	31.06	11.15	33
34	32.15	11.07	32.10	11.21	32.05	11.35	32.00	11.49	34
35	33.09	11.39	33.04	11.54	32.99	11.68	32.94	11.83	35
36	34.04	11.72	33.99	11.87	33.94	12.02	33.88	12.17	36
37	34.98	12.05	34.93	12.20	34.88	12.35	34.82	12.50	37
38	35.93	12.37	35.88	12.53	35.82	12.68	35.76	12.84	38
39	36.88	12.70	36.82	12.86	36.76	13.02	36.71	13.18	39
40	37.82	13.02	37.76	13.19	37.71	13.35	37.65	13.52	40
41	38.77	13.35	38.71	13.52	38.65	13.69	38.59	13.85	41
42	39.71	13.67	39.65	13.85	39.59	14.02	39.53	14.19	42
43	40.66	14.00	40.60	14.18	40.53	14.35	40.47	14.53	43
44	41.60	14.32	41.54	14.51	41.48	14.69	41.41	14.87	44
45	42.55	14.65	42.48	14.84	42.42	15.02	42.35	15.21	45
46	43.49	14.98	43.43	15.17	43.36	15.36	43.29	15.54	46
47	44.44	15.30	44.37	15.50	44.30	15.69	44.24	15.88	47
48	45.38	15.63	45.32	15.83	45.25	16.02	45.18	16.22	48
49	46.33	15.95	46.26	16.15	46.19	16.36	46.12	16.56	49
50	47.28	16.28	47.20	16.48	47.13	16.69	47.06	16.90	50
Distance.	71 DEG.		70 $\frac{3}{4}$ DEG.		70 $\frac{1}{2}$ DEG.		70 $\frac{1}{4}$ DEG.		Distance.
	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	

Distance.	19 DEG.		19½ DEG.		19½ DEG.		19¾ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	43-22	16-60	43-15	16-81	43-07	17-02	43-00	17-23	51
52	43-17	16-93	43-09	17-14	43-02	17-36	43-04	17-57	52
53	50-11	17-26	50-04	17-47	49-96	17-69	49-88	17-91	53
54	51-06	17-58	50-98	17-80	50-90	18-03	50-82	18-25	54
55	52-00	17-91	51-92	18-13	51-85	18-36	51-76	18-59	55
56	52-95	18-23	52-87	18-46	52-79	18-69	52-71	18-92	56
57	53-89	18-56	53-81	18-79	53-73	19-03	53-65	19-26	57
58	54-84	18-88	54-76	19-12	54-67	19-36	54-59	19-60	58
59	55-79	19-21	55-70	19-45	55-62	19-69	55-53	19-94	59
60	56-73	19-53	56-65	19-78	56-56	20-03	56-47	20-27	60
61	57-68	19-86	57-59	20-11	57-50	20-36	57-41	20-61	61
62	58-62	20-19	58-53	20-44	58-44	20-70	58-35	20-95	62
63	59-57	20-51	59-48	20-77	59-39	21-03	59-29	21-29	63
64	60-51	20-84	60-42	21-10	60-33	21-36	60-24	21-63	64
65	61-46	21-16	61-37	21-43	61-27	21-70	61-18	21-96	65
66	62-40	21-49	62-31	21-76	62-21	22-03	62-12	22-30	66
67	63-35	21-81	63-25	22-09	63-16	22-37	63-06	22-64	67
68	64-30	22-14	64-20	22-42	64-10	22-70	64-00	22-98	68
69	65-24	22-46	65-14	22-75	65-04	23-03	64-94	23-32	69
70	66-19	22-79	66-09	23-08	65-98	23-37	65-88	23-65	70
71	67-13	23-12	67-03	23-41	66-93	23-70	66-82	23-99	71
72	68-08	23-44	67-97	23-74	67-87	24-03	67-76	24-33	72
73	69-02	23-77	68-92	24-07	68-81	24-37	68-71	24-67	73
74	69-97	24-09	69-86	24-40	69-76	24-70	69-65	25-01	74
75	70-91	24-42	70-81	24-73	70-70	25-04	70-59	25-34	75
76	71-86	24-74	71-75	25-06	71-64	25-37	71-53	25-68	76
77	72-80	25-07	72-69	25-39	72-58	25-70	72-47	26-02	77
78	73-75	25-39	73-64	25-72	73-53	26-04	73-41	26-36	78
79	74-70	25-72	74-58	26-05	74-47	26-37	74-35	26-70	79
80	75-64	26-05	75-53	26-38	75-41	26-70	75-29	27-03	80
81	76-59	26-37	76-47	26-70	76-35	27-04	76-24	27-37	81
82	77-53	26-70	77-42	27-03	77-30	27-37	77-18	27-71	82
83	78-48	27-02	78-36	27-36	78-24	27-71	78-12	28-05	83
84	79-42	27-35	79-30	27-69	79-18	28-04	79-06	28-39	84
85	80-37	27-67	80-25	28-02	80-12	28-37	80-00	28-72	85
86	81-31	28-00	81-19	28-35	81-07	28-71	80-94	29-06	86
87	82-26	28-32	82-14	28-68	82-01	29-04	81-88	29-40	87
88	83-21	28-65	83-08	29-01	82-95	29-37	82-82	29-74	88
89	84-15	28-98	84-02	29-34	83-90	29-71	83-76	30-07	89
90	85-10	29-30	84-97	29-67	84-84	30-04	84-71	30-41	90
91	86-04	29-63	85-91	30-00	85-78	30-38	85-65	30-75	91
92	86-99	29-95	86-86	30-33	86-72	30-71	86-59	31-09	92
93	87-93	30-28	87-80	30-66	87-67	31-04	87-53	31-43	93
94	88-88	30-60	88-74	30-99	88-61	31-38	88-47	31-76	94
95	89-82	30-93	89-69	31-32	89-55	31-71	89-41	32-10	95
96	90-77	31-25	90-63	31-65	90-49	32-05	90-35	32-44	96
97	91-72	31-58	91-58	31-98	91-44	32-38	91-29	32-78	97
98	92-66	31-91	92-52	32-31	92-38	32-71	92-24	33-12	98
99	93-61	32-23	93-46	32-64	93-32	33-05	93-18	33-45	99
100	94-55	32-56	94-41	32-97	94-26	33-38	94-12	33-79	100
Distance.	71 DEG.		70¾ DEG.		70½ DEG.		70¼ DEG.		Distance.
	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	

Distance.	20 DEG.		20 $\frac{1}{4}$ DEG.		20 $\frac{1}{2}$ DEG.		20 $\frac{3}{4}$ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	0.94	0.34	0.94	0.35	0.94	0.35	0.94	0.35	1
2	1.88	0.68	1.88	0.69	1.87	0.70	1.87	0.71	2
3	2.82	1.03	2.81	1.04	2.81	1.05	2.81	1.06	3
4	3.76	1.37	3.75	1.38	3.75	1.40	3.74	1.42	4
5	4.70	1.71	4.69	1.73	4.68	1.75	4.68	1.77	5
6	5.64	2.05	5.63	2.08	5.62	2.10	5.61	2.13	6
7	6.58	2.39	6.57	2.42	6.56	2.45	6.55	2.48	7
8	7.52	2.74	7.51	2.77	7.49	2.80	7.48	2.83	8
9	8.46	3.08	8.44	3.12	8.43	3.15	8.42	3.19	9
10	9.40	3.42	9.38	3.46	9.37	3.50	9.35	3.54	10
11	10.34	3.76	10.32	3.81	10.30	3.85	10.29	3.90	11
12	11.28	4.10	11.26	4.15	11.24	4.20	11.22	4.25	12
13	12.22	4.45	12.20	4.50	12.18	4.55	12.16	4.61	13
14	13.16	4.79	13.13	4.85	13.11	4.90	13.09	4.96	14
15	14.10	5.13	14.07	5.19	14.05	5.25	14.03	5.31	15
16	15.04	5.47	15.01	5.54	14.99	5.60	14.96	5.67	16
17	15.97	5.81	15.95	5.88	15.92	5.95	15.90	6.02	17
18	16.91	6.16	16.89	6.23	16.86	6.30	16.83	6.38	18
19	17.85	6.50	17.83	6.58	17.81	6.65	17.77	6.73	19
20	18.79	6.84	18.76	6.92	18.73	7.00	18.70	7.09	20
21	19.73	7.18	19.70	7.27	19.67	7.35	19.64	7.44	21
22	20.67	7.52	20.64	7.61	20.61	7.70	20.57	7.79	22
23	21.61	7.87	21.58	7.96	21.54	8.05	21.51	8.15	23
24	22.55	8.21	22.52	8.31	22.48	8.40	22.44	8.50	24
25	23.49	8.55	23.45	8.65	23.42	8.76	23.38	8.86	25
26	24.43	8.89	24.39	9.00	24.35	9.11	24.31	9.21	26
27	25.37	9.23	25.33	9.35	25.29	9.46	25.25	9.57	27
28	26.31	9.58	26.27	9.69	26.23	9.81	26.18	9.92	28
29	27.25	9.92	27.21	10.04	27.16	10.16	27.12	10.27	29
30	28.19	10.26	28.15	10.38	28.10	10.51	28.05	10.63	30
31	29.13	10.60	29.08	10.73	29.04	10.86	28.99	10.98	31
32	30.07	10.94	30.02	11.08	29.97	11.21	29.92	11.34	32
33	31.01	11.29	30.96	11.42	30.91	11.56	30.86	11.69	33
34	31.95	11.63	31.90	11.77	31.85	11.91	31.79	12.05	34
35	32.89	11.97	32.84	12.11	32.78	12.26	32.73	12.40	35
36	33.83	12.31	33.77	12.46	33.72	12.61	33.66	12.75	36
37	34.77	12.65	34.71	12.81	34.66	12.96	34.60	13.11	37
38	35.71	13.00	35.65	13.15	35.59	13.31	35.54	13.46	38
39	36.65	13.34	36.59	13.50	36.53	13.66	36.47	13.82	39
40	37.59	13.68	37.53	13.84	37.47	14.01	37.41	14.17	40
41	38.53	14.02	38.47	14.19	38.40	14.36	38.34	14.53	41
42	39.47	14.36	39.40	14.54	39.34	14.71	39.28	14.88	42
43	40.41	14.71	40.34	14.88	40.28	15.06	40.21	15.23	43
44	41.35	15.05	41.28	15.23	41.21	15.41	41.15	15.59	44
45	42.29	15.39	42.22	15.58	42.15	15.76	42.08	15.94	45
46	43.23	15.73	43.16	15.92	43.09	16.11	43.02	16.30	46
47	44.17	16.07	44.09	16.27	44.02	16.46	43.95	16.65	47
48	45.11	16.42	45.03	16.61	44.96	16.81	44.89	17.01	48
49	46.04	16.76	45.97	16.96	45.90	17.16	45.82	17.36	49
50	46.98	17.10	46.91	17.31	46.83	17.51	46.76	17.71	50
Distance.	70 DEG.		69 $\frac{3}{4}$ DEG.		69 $\frac{1}{2}$ DEG.		69 $\frac{1}{4}$ DEG.		Distance.
	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	

Distance.	20 DEG.		20 $\frac{1}{2}$ DEG.		20 $\frac{1}{2}$ DEG.		20 $\frac{3}{4}$ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	47°02'	17'44"	47°05'	17'65"	47°07'	17'86"	47°09'	18'07"	51
52	48°06'	17'79"	48°09'	18'00"	48°11'	18'21"	48°13'	18'42"	52
53	49°08'	18'13"	49°12'	18'34"	49°14'	18'56"	49°16'	18'78"	53
54	50°14'	18'47"	50°18'	18'69"	50°20'	18'91"	50°22'	19'13"	54
55	51°03'	18'81"	51°07'	19'04"	51°09'	19'26"	51°11'	19'49"	55
56	52°02'	19'15"	52°06'	19'38"	52°08'	19'61"	52°10'	19'84"	56
57	53°06'	19'50"	53°10'	19'73"	53°12'	19'96"	53°14'	20'19"	57
58	54°09'	19'84"	54°13'	20'07"	54°15'	20'31"	54°17'	20'55"	58
59	55°44'	20'18"	55°48'	20'42"	55°50'	20'66"	55°52'	20'90"	59
60	56°38'	20'52"	56°42'	20'77"	56°44'	21'01"	56°46'	21'26"	60
61	57°32'	20'86"	57°36'	21'11"	57°38'	21'36"	57°40'	21'61"	61
62	58°26'	21'21"	58°30'	21'46"	58°32'	21'71"	58°34'	21'97"	62
63	59°20'	21'55"	59°24'	21'81"	59°26'	22'06"	59°28'	22'32"	63
64	60°14'	21'89"	60°18'	22'15"	60°20'	22'41"	60°22'	22'67"	64
65	61°08'	22'23"	61°12'	22'50"	61°14'	22'76"	61°16'	23'03"	65
66	62°02'	22'57"	62°06'	22'84"	62°08'	23'11"	62°10'	23'38"	66
67	62°46'	22'92"	62°50'	23'19"	62°52'	23'46"	62°54'	23'74"	67
68	63°40'	23'26"	63°44'	23'54"	63°46'	23'81"	63°48'	24'09"	68
69	64°34'	23'60"	64°38'	23'88"	64°40'	24'16"	64°42'	24'45"	69
70	65°28'	23'94"	65°32'	24'23"	65°34'	24'51"	65°36'	24'80"	70
71	66°22'	24'28"	66°26'	24'57"	66°28'	24'86"	66°30'	25'15"	71
72	67°16'	24'63"	67°20'	24'92"	67°22'	25'21"	67°24'	25'51"	72
73	68°10'	24'97"	68°14'	25'27"	68°16'	25'57"	68°18'	25'86"	73
74	69°04'	25'31"	69°08'	25'61"	69°10'	25'92"	69°12'	26'22"	74
75	70°08'	25'65"	70°12'	25'96"	70°14'	26'27"	70°16'	26'57"	75
76	71°02'	25'99"	71°06'	26'30"	71°08'	26'62"	71°10'	26'93"	76
77	72°06'	26'34"	72°10'	26'65"	72°12'	26'97"	72°14'	27'28"	77
78	73°00'	26'68"	73°04'	27'00"	73°06'	27'32"	73°08'	27'63"	78
79	74°04'	27'02"	74°08'	27'34"	74°10'	27'67"	74°12'	27'99"	79
80	75°08'	27'36"	75°12'	27'69"	75°14'	28'02"	75°16'	28'34"	80
81	76°12'	27'70"	76°16'	28'04"	76°18'	28'37"	76°20'	28'70"	81
82	77°16'	28'05"	77°20'	28'38"	77°22'	28'72"	77°24'	29'05"	82
83	78°20'	28'39"	78°24'	28'73"	78°26'	29'07"	78°28'	29'41"	83
84	79°24'	28'73"	79°28'	29'07"	79°30'	29'42"	79°32'	29'76"	84
85	80°28'	29'07"	80°32'	29'42"	80°34'	29'77"	80°36'	30'11"	85
86	81°32'	29'41"	81°36'	29'77"	81°38'	30'12"	81°40'	30'47"	86
87	82°36'	29'76"	82°40'	30'11"	82°42'	30'47"	82°44'	30'82"	87
88	83°40'	30'10"	83°44'	30'46"	83°46'	30'82"	83°48'	31'18"	88
89	84°44'	30'44"	84°48'	30'80"	84°50'	31'17"	84°52'	31'53"	89
90	85°48'	30'78"	85°52'	31'15"	85°54'	31'52"	85°56'	31'89"	90
91	86°52'	31'12"	86°56'	31'50"	87°00'	31'87"	87°02'	32'24"	91
92	87°56'	31'47"	88°00'	31'84"	88°02'	32'22"	88°04'	32'59"	92
93	88°59'	31'81"	89°03'	32'19"	89°05'	32'57"	89°07'	32'95"	93
94	89°53'	32'15"	89°57'	32'54"	90°00'	32'92"	90°02'	33'30"	94
95	90°47'	32'49"	90°51'	32'88"	90°53'	33'27"	90°55'	33'66"	95
96	91°41'	32'83"	91°45'	33'23"	91°47'	33'62"	91°49'	34'01"	96
97	92°35'	33'18"	92°39'	33'57"	92°41'	33'97"	92°43'	34'37"	97
98	93°29'	33'52"	93°33'	33'92"	93°35'	34'32"	93°37'	34'72"	98
99	94°23'	33'86"	94°27'	34'27"	94°29'	34'67"	94°31'	35'07"	99
100	95°17'	34'20"	95°21'	34'61"	95°23'	35'02"	95°25'	35'43"	100
Distance.	70 DEG.		69 $\frac{1}{2}$ DEG.		69 $\frac{1}{2}$ DEG.		69 $\frac{1}{2}$ DEG.		Distance.
	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	

Distance.	21 DEG.		21½ DEG.		21½ DEG.		21¾ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	0-93	0-36	0-93	0-36	0-93	0-37	0-93	0-37	1
2	1-87	0-72	1-86	0-72	1-86	0-73	1-86	0-74	2
3	2-80	1-08	2-80	1-09	2-79	1-10	2-79	1-11	3
4	3-73	1-43	3-73	1-45	3-72	1-47	3-72	1-48	4
5	4-67	1-79	4-66	1-81	4-65	1-83	4-64	1-85	5
6	5-60	2-15	5-59	2-17	5-58	2-20	5-57	2-22	6
7	6-54	2-51	6-52	2-54	6-51	2-57	6-50	2-59	7
8	7-47	2-87	7-46	2-90	7-44	2-93	7-43	2-96	8
9	8-40	3-23	8-39	3-26	8-37	3-30	8-36	3-34	9
10	9-34	3-58	9-32	3-62	9-30	3-67	9-29	3-71	10
11	10-27	3-94	10-25	3-99	10-23	4-03	10-22	4-08	11
12	11-20	4-30	11-18	4-35	11-17	4-40	11-15	4-45	12
13	12-14	4-66	12-12	4-71	12-10	4-76	12-07	4-82	13
14	13-07	5-02	13-05	5-07	13-03	5-13	13-00	5-19	14
15	14-00	5-38	13-08	5-44	13-06	5-50	13-03	5-56	15
16	14-94	5-73	14-91	5-80	14-89	5-86	14-86	5-93	16
17	15-87	6-09	15-84	6-16	15-82	6-23	15-79	6-30	17
18	16-80	6-45	16-78	6-52	16-75	6-60	16-72	6-67	18
19	17-74	6-81	17-71	6-89	17-68	6-96	17-65	7-04	19
20	18-67	7-17	18-64	7-25	18-61	7-33	18-58	7-41	20
21	19-61	7-53	19-57	7-61	19-54	7-70	19-50	7-78	21
22	20-54	7-88	20-50	7-97	20-47	8-06	20-43	8-15	22
23	21-47	8-24	21-44	8-34	21-40	8-43	21-36	8-52	23
24	22-41	8-60	22-37	8-70	22-33	8-80	22-29	8-89	24
25	23-34	8-96	23-30	9-06	23-26	9-16	23-22	9-26	25
26	24-27	9-32	24-23	9-42	24-19	9-53	24-15	9-63	26
27	25-21	9-68	25-16	9-79	25-12	9-90	25-08	10-01	27
28	26-14	10-03	26-10	10-15	26-05	10-26	26-01	10-38	28
29	27-07	10-39	27-03	10-51	26-98	10-63	26-94	10-75	29
30	28-01	10-75	27-96	10-87	27-91	11-00	27-86	11-12	30
31	28-94	11-11	28-89	11-24	28-84	11-36	28-79	11-49	31
32	29-87	11-47	29-82	11-60	29-77	11-73	29-72	11-86	32
33	30-81	11-83	30-76	11-96	30-70	12-09	30-65	12-23	33
34	31-74	12-18	31-69	12-32	31-63	12-46	31-58	12-60	34
35	32-68	12-54	32-62	12-69	32-56	12-83	32-51	12-97	35
36	33-61	12-90	33-55	13-05	33-50	13-19	33-44	13-34	36
37	34-54	13-26	34-48	13-41	34-43	13-56	34-37	13-71	37
38	35-48	13-62	35-42	13-77	35-36	13-93	35-29	14-08	38
39	36-41	13-98	36-35	14-14	36-29	14-29	36-22	14-45	39
40	37-34	14-33	37-28	14-50	37-22	14-66	37-15	14-82	40
41	38-28	14-69	38-21	14-86	38-15	15-03	38-08	15-19	41
42	39-21	15-05	39-14	15-22	39-08	15-39	39-01	15-56	42
43	40-14	15-41	40-08	15-58	40-01	15-76	39-94	15-93	43
44	41-08	15-77	41-01	15-95	40-94	16-13	40-87	16-30	44
45	42-01	16-13	41-94	16-31	41-87	16-49	41-80	16-68	45
46	42-94	16-48	42-87	16-67	42-80	16-86	42-73	17-05	46
47	43-88	16-84	43-80	17-03	43-73	17-23	43-65	17-42	47
48	44-81	17-20	44-74	17-40	44-66	17-59	44-58	17-79	48
49	45-75	17-56	45-67	17-76	45-59	17-96	45-51	18-16	49
50	46-68	17-92	46-60	18-12	46-52	18-33	46-44	18-53	50
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	69 DEG.		68¾ DEG.		68½ DEG.		68¼ DEG.		

Distance.	21 DEG.		21 $\frac{1}{4}$ DEG.		21 $\frac{1}{2}$ DEG.		21 $\frac{3}{4}$ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	47°61	18°28	47°53	18°48	47°45	18°69	47°37	18°90	51
52	48°55	18°64	48°46	18°85	48°38	19°06	48°30	19°27	52
53	49°48	18°99	49°40	19°21	49°31	19°42	49°23	19°64	53
54	50°41	19°35	50°33	19°57	50°24	19°79	50°16	20°01	54
55	51°35	19°71	51°26	19°93	51°17	20°16	51°08	20°38	55
56	52°28	20°07	52°19	20°30	52°10	20°52	52°01	20°75	56
57	53°21	20°43	53°12	20°66	53°03	20°89	52°94	21°12	57
58	54°15	20°79	54°06	21°02	53°96	21°25	53°87	21°49	58
59	55°08	21°14	54°99	21°38	54°89	21°62	54°80	21°86	59
60	56°01	21°50	55°92	21°75	55°83	21°99	55°73	22°23	60
61	56°95	21°86	56°85	22°11	56°76	22°36	56°66	22°60	61
62	57°88	22°22	57°78	22°47	57°69	22°72	57°59	22°97	62
63	58°82	22°58	58°72	22°83	58°62	23°09	58°52	23°35	63
64	59°75	22°94	59°65	23°20	59°55	23°46	59°44	23°72	64
65	60°68	23°29	60°58	23°56	60°48	23°82	60°37	24°09	65
66	61°62	23°65	61°51	23°92	61°41	24°19	61°30	24°46	66
67	62°55	24°01	62°44	24°28	62°34	24°56	62°23	24°83	67
68	63°48	24°37	63°38	24°65	63°27	24°92	63°16	25°20	68
69	64°42	24°73	64°31	25°01	64°20	25°29	64°09	25°57	69
70	65°35	25°09	65°24	25°37	65°13	25°66	65°02	25°94	70
71	66°28	25°44	66°17	25°73	66°06	26°02	65°95	26°31	71
72	67°22	25°80	67°10	26°10	66°99	26°39	66°87	26°68	72
73	68°15	26°16	68°04	26°46	67°92	26°75	67°80	27°05	73
74	69°08	26°52	68°97	26°82	68°85	27°12	68°73	27°42	74
75	70°02	26°88	69°90	27°18	69°78	27°49	69°66	27°79	75
76	70°95	27°24	70°83	27°55	70°71	27°85	70°59	28°16	76
77	71°89	27°59	71°76	27°91	71°64	28°22	71°52	28°53	77
78	72°82	27°95	72°70	28°27	72°57	28°59	72°45	28°90	78
79	73°75	28°31	73°63	28°63	73°50	28°95	73°38	29°27	79
80	74°69	28°67	74°56	29°00	74°43	29°32	74°30	29°64	80
81	75°62	29°03	75°49	29°36	75°36	29°69	75°23	30°02	81
82	76°55	29°39	76°42	29°72	76°29	30°05	76°16	30°39	82
83	77°49	29°74	77°36	30°08	77°22	30°42	77°09	30°76	83
84	78°42	30°10	78°29	30°44	78°16	30°79	78°02	31°13	84
85	79°35	30°46	79°22	30°81	79°09	31°15	78°95	31°50	85
86	80°29	30°82	80°15	31°17	80°02	31°52	79°88	31°87	86
87	81°22	31°18	81°08	31°53	80°95	31°89	80°81	32°24	87
88	82°16	31°54	82°02	31°89	81°88	32°25	81°74	32°61	88
89	83°09	31°89	82°95	32°26	82°81	32°62	82°66	32°98	89
90	84°02	32°25	83°88	32°62	83°74	32°99	83°59	33°35	90
91	84°96	32°61	84°81	32°98	84°67	33°35	84°52	33°72	91
92	85°89	32°97	85°74	33°34	85°60	33°72	85°45	34°09	92
93	86°82	33°33	86°68	33°71	86°53	34°08	86°38	34°46	93
94	87°76	33°69	87°61	34°07	87°46	34°45	87°31	34°83	94
95	88°69	34°04	88°54	34°43	88°39	34°82	88°24	35°20	95
96	89°62	34°40	89°47	34°79	89°32	35°18	89°17	35°57	96
97	90°56	34°76	90°40	35°16	90°25	35°55	90°09	35°94	97
98	91°49	35°12	91°34	35°52	91°18	35°92	91°02	36°31	98
99	92°42	35°48	92°27	35°88	92°11	36°28	91°95	36°69	99
100	93°36	35°84	93°20	36°24	93°04	36°65	92°88	37°06	100
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	69 DEG.		68 $\frac{3}{4}$ DEG.		68 $\frac{1}{2}$ DEG.		68 $\frac{1}{4}$ DEG.		

Distance.	22 DEG.		22 $\frac{1}{4}$ DEG.		22 $\frac{1}{2}$ DEG.		22 $\frac{3}{4}$ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	0 93	0 37	0 93	0 38	0 92	0 38	0 92	0 39	1
2	1 85	0 75	1 85	0 76	1 85	0 77	1 84	0 77	2
3	2 78	1 12	2 78	1 14	2 77	1 15	2 77	1 16	3
4	3 71	1 50	3 70	1 51	3 70	1 53	3 69	1 55	4
5	4 64	1 87	4 63	1 89	4 62	1 91	4 61	1 93	5
6	5 56	2 25	5 55	2 27	5 54	2 30	5 53	2 32	6
7	6 49	2 62	6 48	2 65	6 47	2 68	6 46	2 71	7
8	7 42	3 00	7 40	3 03	7 39	3 06	7 38	3 09	8
9	8 34	3 37	8 33	3 41	8 31	3 44	8 30	3 48	9
10	9 27	3 75	9 26	3 79	9 24	3 83	9 22	3 87	10
11	10 20	4 12	10 18	4 17	10 16	4 21	10 14	4 25	11
12	11 13	4 50	11 11	4 54	11 09	4 59	11 07	4 64	12
13	12 05	4 87	12 03	4 92	12 01	4 97	11 99	5 03	13
14	12 98	5 24	12 96	5 30	12 93	5 36	12 91	5 41	14
15	13 91	5 62	13 88	5 68	13 86	5 74	13 83	5 80	15
16	14 83	5 99	14 81	6 06	14 78	6 12	14 76	6 19	16
17	15 76	6 37	15 73	6 44	15 71	6 51	15 68	6 57	17
18	16 69	6 74	16 66	6 82	16 63	6 89	16 60	6 96	18
19	17 62	7 12	17 59	7 19	17 55	7 27	17 52	7 35	19
20	18 54	7 49	18 51	7 57	18 48	7 65	18 44	7 73	20
21	19 47	7 87	19 44	7 95	19 40	8 04	19 37	8 12	21
22	20 40	8 24	20 36	8 33	20 33	8 42	20 29	8 51	22
23	21 33	8 62	21 29	8 71	21 25	8 80	21 21	8 89	23
24	22 25	8 99	22 21	9 09	22 17	9 18	22 13	9 28	24
25	23 18	9 37	23 14	9 47	23 10	9 57	23 05	9 67	25
26	24 11	9 74	24 06	9 84	24 02	9 95	23 98	10 05	26
27	25 03	10 11	24 99	10 22	24 94	10 33	24 90	10 44	27
28	25 96	10 49	25 92	10 60	25 87	10 72	25 82	10 83	28
29	26 89	10 86	26 84	10 98	26 79	11 10	26 74	11 21	29
30	27 82	11 24	27 77	11 36	27 72	11 48	27 67	11 60	30
31	28 74	11 61	28 69	11 74	28 64	11 86	28 59	11 99	31
32	29 67	11 99	29 62	12 12	29 56	12 25	29 51	12 37	32
33	30 60	12 36	30 54	12 50	30 49	12 63	30 43	12 76	33
34	31 52	12 74	31 47	12 87	31 41	13 01	31 35	13 15	34
35	32 45	13 11	32 39	13 25	32 34	13 39	32 28	13 53	35
36	33 38	13 49	33 32	13 63	33 26	13 78	33 20	13 92	36
37	34 31	13 86	34 24	14 01	34 18	14 16	34 12	14 31	37
38	35 23	14 24	35 17	14 39	35 11	14 54	35 04	14 70	38
39	36 16	14 61	36 10	14 77	36 03	14 92	35 97	15 08	39
40	37 09	14 98	37 02	15 15	36 96	15 31	36 89	15 47	40
41	38 01	15 36	37 95	15 52	37 88	15 69	37 81	15 86	41
42	38 94	15 73	38 87	15 90	38 80	16 07	38 73	16 24	42
43	39 87	16 11	39 80	16 28	39 73	16 46	39 65	16 63	43
44	40 80	16 48	40 72	16 66	40 65	16 84	40 58	17 02	44
45	41 72	16 86	41 65	17 04	41 57	17 22	41 50	17 40	45
46	42 65	17 23	42 57	17 42	42 50	17 60	42 42	17 79	46
47	43 58	17 61	43 50	17 80	43 42	17 99	43 34	18 18	47
48	44 50	17 98	44 43	18 18	44 35	18 37	44 27	18 56	48
49	45 43	18 36	45 35	18 55	45 27	18 75	45 19	18 95	49
50	46 36	18 73	46 28	18 93	46 19	19 13	46 11	19 34	50
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	68 DEG.		67 $\frac{3}{4}$ DEG.		67 $\frac{1}{2}$ DEG.		67 $\frac{1}{4}$ DEG.		

Distance.	22 DEG.		22½ DEG.		22½ DEG.		22¾ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	47°29	19°10	47°20	19°31	47°12	19°52	47°03	19°72	51
52	48°21	19°48	48°13	19°69	48°04	19°90	47°95	20°11	52
53	49°14	19°85	49°05	20°07	48°97	20°28	48°88	20°50	53
54	50°07	20°23	49°98	20°45	49°89	20°66	49°80	20°88	54
55	51°00	20°60	50°90	20°83	50°81	21°05	50°72	21°27	55
56	51°92	20°98	51°83	21°20	51°74	21°43	51°64	21°66	56
57	52°85	21°35	52°76	21°58	52°66	21°81	52°57	22°04	57
58	53°78	21°73	53°68	21°96	53°59	22°20	53°49	22°43	58
59	54°70	22°10	54°61	22°34	54°51	22°58	54°41	22°82	59
60	55°63	22°48	55°53	22°72	55°43	22°96	55°33	23°20	60
61	56°56	22°85	56°47	23°10	56°36	23°34	56°25	23°59	61
62	57°49	23°23	57°38	23°48	57°28	23°73	57°18	23°98	62
63	58°41	23°60	58°31	23°85	58°20	24°11	58°10	24°36	63
64	59°34	23°97	59°23	24°23	59°13	24°49	59°02	24°75	64
65	60°27	24°35	60°16	24°61	60°05	24°87	59°94	25°14	65
66	61°19	24°72	61°09	24°99	60°98	25°26	60°87	25°52	66
67	62°12	25°10	62°01	25°37	61°90	25°64	61°79	25°91	67
68	63°05	25°47	62°94	25°75	62°82	26°02	62°71	26°30	68
69	63°98	25°85	63°86	26°13	63°75	26°41	63°63	26°68	69
70	64°90	26°22	64°79	26°51	64°67	26°79	64°55	27°07	70
71	65°83	26°60	65°71	26°88	65°60	27°17	65°48	27°46	71
72	66°76	26°97	66°64	27°26	66°52	27°55	66°40	27°84	72
73	67°68	27°35	67°56	27°64	67°44	27°94	67°32	28°23	73
74	68°61	27°72	68°49	28°02	68°37	28°32	68°24	28°62	74
75	69°54	28°10	69°42	28°40	69°29	28°70	69°17	29°00	75
76	70°47	28°47	70°34	28°78	70°21	29°08	70°09	29°39	76
77	71°39	28°84	71°27	29°16	71°14	29°47	71°01	29°78	77
78	72°32	29°22	72°19	29°53	72°06	29°85	71°93	30°16	78
79	73°25	29°59	73°12	29°91	72°99	30°23	72°85	30°55	79
80	74°17	29°97	74°04	30°29	73°91	30°61	73°78	30°94	80
81	75°10	30°34	74°97	30°67	74°83	31°00	74°70	31°32	81
82	76°03	30°72	75°89	31°05	75°76	31°38	75°62	31°71	82
83	76°96	31°09	76°82	31°43	76°68	31°76	76°54	32°10	83
84	77°88	31°47	77°75	31°81	77°61	32°15	77°46	32°48	84
85	78°81	31°84	78°67	32°19	78°53	32°53	78°39	32°87	85
86	79°74	32°22	79°60	32°56	79°45	32°91	79°31	33°26	86
87	80°66	32°59	80°52	32°94	80°38	33°29	80°23	33°64	87
88	81°59	32°97	81°45	33°32	81°30	33°68	81°15	34°03	88
89	82°52	33°34	82°37	33°70	82°23	34°06	82°08	34°42	89
90	83°45	33°71	83°30	34°08	83°15	34°44	83°00	34°80	90
91	84°37	34°09	84°22	34°46	84°07	34°82	83°92	35°19	91
92	85°30	34°46	85°15	34°84	85°00	35°21	84°84	35°58	92
93	86°23	34°84	86°08	35°21	85°92	35°59	85°76	35°96	93
94	87°16	35°21	87°00	35°59	86°84	35°97	86°69	36°35	94
95	88°08	35°59	87°93	35°97	87°77	36°35	87°61	36°74	95
96	89°01	35°96	88°85	36°35	88°69	36°74	88°53	37°12	96
97	89°94	36°34	89°78	36°73	89°62	37°12	89°45	37°51	97
98	90°86	36°71	90°70	37°11	90°54	37°50	90°38	37°90	98
99	91°79	37°09	91°63	37°49	91°46	37°89	91°30	38°28	99
100	92°72	37°46	92°55	37°86	92°39	38°27	92°22	38°67	100
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	68 DEG.		67½ DEG.		67½ DEG.		67¼ DEG.		

Distance.	23 DEG.		23 $\frac{1}{4}$ DEG.		23 $\frac{1}{2}$ DEG.		23 $\frac{3}{4}$ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	0-92	0-39	0-92	0-39	0-92	0-40	0-92	0-40	1
2	1-84	0-78	1-84	0-79	1-83	0-80	1-83	0-81	2
3	2-76	1-17	2-76	1-18	2-75	1-20	2-75	1-21	3
4	3-68	1-56	3-68	1-58	3-67	1-59	3-66	1-61	4
5	4-60	1-95	4-59	1-97	4-59	1-99	4-58	2-01	5
6	5-52	2-34	5-51	2-37	5-50	2-39	5-49	2-42	6
7	6-44	2-74	6-43	2-76	6-42	2-79	6-41	2-82	7
8	7-36	3-13	7-35	3-16	7-34	3-19	7-32	3-22	8
9	8-28	3-52	8-27	3-55	8-25	3-59	8-24	3-62	9
10	9-20	3-91	9-19	3-95	9-17	3-99	9-15	4-03	10
11	10-13	4-30	10-11	4-34	10-09	4-39	10-07	4-43	11
12	11-05	4-69	11-03	4-74	11-00	4-78	10-98	4-83	12
13	11-97	5-08	11-94	5-13	11-92	5-18	11-90	5-24	13
14	12-89	5-47	12-86	5-53	12-84	5-58	12-81	5-64	14
15	13-81	5-86	13-78	5-92	13-76	5-98	13-73	6-04	15
16	14-73	6-25	14-70	6-32	14-67	6-38	14-64	6-44	16
17	15-65	6-64	15-62	6-71	15-59	6-78	15-56	6-85	17
18	16-57	7-03	16-54	7-11	16-51	7-18	16-48	7-25	18
19	17-49	7-42	17-46	7-50	17-42	7-58	17-39	7-65	19
20	18-41	7-81	18-38	7-89	18-34	7-97	18-31	8-05	20
21	19-33	8-21	19-29	8-29	19-26	8-37	19-22	8-46	21
22	20-25	8-60	20-21	8-68	20-18	8-77	20-14	8-86	22
23	21-17	8-99	21-13	9-08	21-09	9-17	21-05	9-26	23
24	22-09	9-38	22-05	9-47	22-01	9-57	21-97	9-67	24
25	23-01	9-77	22-97	9-87	22-93	9-97	22-88	10-07	25
26	23-93	10-16	23-89	10-26	23-84	10-37	23-80	10-47	26
27	24-85	10-55	24-81	10-66	24-76	10-77	24-71	10-87	27
28	25-77	10-94	25-73	11-05	25-68	11-16	25-63	11-28	28
29	26-69	11-33	26-64	11-45	26-59	11-56	26-54	11-68	29
30	27-62	11-72	27-56	11-84	27-51	11-96	27-46	12-08	30
31	28-54	12-11	28-48	12-24	28-43	12-36	28-37	12-49	31
32	29-46	12-50	29-40	12-63	29-35	12-76	29-29	12-89	32
33	30-38	12-89	30-32	13-03	30-26	13-16	30-21	13-29	33
34	31-30	13-28	31-24	13-42	31-18	13-56	31-12	13-69	34
35	32-22	13-68	32-16	13-82	32-10	13-96	32-04	14-10	35
36	33-14	14-07	33-08	14-21	33-01	14-35	32-95	14-50	36
37	34-06	14-46	34-00	14-61	33-93	14-75	33-87	14-90	37
38	34-98	14-85	34-91	15-00	34-85	15-15	34-78	15-30	38
39	35-90	15-24	35-83	15-39	35-77	15-55	35-70	15-71	39
40	36-82	15-63	36-75	15-79	36-68	15-95	36-61	16-11	40
41	37-74	16-02	37-67	16-18	37-60	16-35	37-53	16-51	41
42	38-66	16-41	38-59	16-58	38-52	16-75	38-44	16-92	42
43	39-58	16-80	39-51	16-97	39-43	17-15	39-36	17-32	43
44	40-50	17-19	40-43	17-37	40-35	17-54	40-27	17-72	44
45	41-42	17-58	41-35	17-76	41-27	17-94	41-19	18-12	45
46	42-34	17-97	42-26	18-16	42-18	18-34	42-10	18-53	46
47	43-26	18-36	43-18	18-55	43-10	18-74	43-02	18-93	47
48	44-18	18-76	44-10	18-95	44-02	19-14	43-93	19-33	48
49	45-10	19-15	45-02	19-34	44-94	19-54	44-85	19-73	49
50	46-03	19-54	45-94	19-74	45-85	19-94	45-77	20-14	50
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	67 DEG.		66 $\frac{3}{4}$ DEG.		66 $\frac{1}{2}$ DEG.		66 $\frac{1}{4}$ DEG.		

Distance.	23 DEG.		23 $\frac{1}{2}$ DEG.		23 $\frac{1}{2}$ DEG.		23 $\frac{1}{2}$ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	46-95	19-93	46-86	20-13	46-77	20-34	46-68	20-54	51
52	47-87	20-32	47-78	20-53	47-69	20-73	47-60	20-94	52
53	48-79	20-71	48-70	20-92	48-60	21-13	48-51	21-35	53
54	49-71	21-10	49-61	21-32	49-52	21-53	49-43	21-75	54
55	50-63	21-49	50-53	21-71	50-44	21-93	50-34	22-15	55
56	51-55	21-88	51-45	22-11	51-36	22-33	51-26	22-55	56
57	52-47	22-27	52-37	22-50	52-27	22-73	52-17	22-96	57
58	53-39	22-66	53-29	22-90	53-19	23-13	53-09	23-36	58
59	54-31	23-05	54-21	23-29	54-11	23-53	54-00	23-76	59
60	55-23	23-44	55-13	23-68	55-02	23-92	54-92	24-16	60
61	56-15	23-83	56-05	24-08	55-94	24-32	55-83	24-57	61
62	57-07	24-23	56-97	24-47	56-86	24-72	56-75	24-97	62
63	57-99	24-62	57-88	24-87	57-77	25-12	57-66	25-37	63
64	58-91	25-01	58-80	25-26	58-69	25-52	58-58	25-78	64
65	59-83	25-40	59-72	25-66	59-61	25-92	59-50	26-18	65
66	60-75	25-79	60-64	26-05	60-53	26-32	60-41	26-58	66
67	61-67	26-18	61-56	26-45	61-44	26-72	61-33	26-98	67
68	62-59	26-57	62-48	26-84	62-36	27-11	62-24	27-39	68
69	63-51	26-96	63-40	27-24	63-28	27-51	63-16	27-79	69
70	64-44	27-35	64-32	27-63	64-19	27-91	64-07	28-19	70
71	65-36	27-74	65-23	28-03	65-11	28-31	64-99	28-59	71
72	66-28	28-13	66-15	28-42	66-03	28-71	65-90	29-00	72
73	67-20	28-52	67-07	28-82	66-95	29-11	66-82	29-40	73
74	68-12	28-91	67-99	29-21	67-86	29-51	67-73	29-80	74
75	69-04	29-30	68-91	29-61	68-78	29-91	68-65	30-21	75
76	69-96	29-70	69-83	30-00	69-70	30-30	69-56	30-61	76
77	70-88	30-09	70-75	30-40	70-61	30-70	70-48	31-01	77
78	71-80	30-48	71-67	30-79	71-53	31-10	71-39	31-41	78
79	72-72	30-87	72-58	31-18	72-45	31-50	72-31	31-82	79
80	73-64	31-26	73-50	31-58	73-36	31-90	73-22	32-22	80
81	74-56	31-65	74-42	31-97	74-28	32-30	74-14	32-62	81
82	75-48	32-04	75-34	32-37	75-20	32-70	75-06	33-03	82
83	76-40	32-43	76-26	32-76	76-12	33-10	75-97	33-43	83
84	77-32	32-82	77-18	33-16	77-03	33-49	76-89	33-83	84
85	78-24	33-21	78-10	33-55	77-95	33-89	77-80	34-23	85
86	79-16	33-60	79-02	33-95	78-87	34-29	78-72	34-64	86
87	80-08	33-99	79-93	34-34	79-78	34-69	79-63	35-04	87
88	81-00	34-38	80-85	34-74	80-70	35-09	80-55	35-44	88
89	81-92	34-78	81-77	35-13	81-62	35-49	81-46	35-84	89
90	82-85	35-17	82-69	35-53	82-54	35-89	82-38	36-25	90
91	83-77	35-56	83-61	35-92	83-45	36-29	83-29	36-65	91
92	84-69	35-95	84-53	36-32	84-37	36-68	84-21	37-05	92
93	85-61	36-34	85-45	36-71	85-29	37-08	85-12	37-46	93
94	86-53	36-73	86-37	37-11	86-20	37-48	86-04	37-86	94
95	87-45	37-12	87-29	37-50	87-12	37-88	86-95	38-26	95
96	88-37	37-51	88-20	37-90	88-04	38-28	87-87	38-66	96
97	89-29	37-90	89-12	38-29	88-95	38-68	88-79	39-07	97
98	90-21	38-29	90-04	38-68	89-87	39-08	89-70	39-47	98
99	91-13	38-68	90-96	39-08	90-79	39-48	90-62	39-87	99
100	92-05	39-07	91-88	39-47	91-71	39-87	91-53	40-27	100
Distance.	67 DEG.		66 $\frac{1}{2}$ DEG.		66 $\frac{1}{2}$ DEG.		66 $\frac{1}{2}$ DEG.		Distance.
	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	

Distance.	24 DEG.		24 $\frac{1}{2}$ DEG.		24 $\frac{1}{2}$ DEG.		24 $\frac{3}{4}$ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	0-91	0-41	0-91	0-41	0-91	0-41	0-91	0-42	1
2	1-83	0-81	1-82	0-82	1-82	0-83	1-82	0-84	2
3	2-74	1-22	2-74	1-23	2-73	1-24	2-72	1-26	3
4	3-65	1-63	3-65	1-64	3-64	1-66	3-63	1-67	4
5	4-57	2-03	4-56	2-05	4-55	2-07	4-54	2-09	5
6	5-48	2-44	5-47	2-46	5-46	2-49	5-45	2-51	6
7	6-39	2-85	6-38	2-87	6-37	2-90	6-36	2-93	7
8	7-31	3-25	7-29	3-29	7-28	3-32	7-27	3-35	8
9	8-22	3-66	8-21	3-70	8-19	3-73	8-17	3-77	9
10	9-14	4-07	9-12	4-11	9-10	4-15	9-08	4-19	10
11	10-05	4-47	10-03	4-52	10-01	4-56	9-99	4-61	11
12	10-96	4-88	10-94	4-93	10-92	4-98	10-90	5-02	12
13	11-88	5-29	11-85	5-34	11-83	5-39	11-81	5-44	13
14	12-79	5-69	12-76	5-75	12-74	5-81	12-71	5-86	14
15	13-70	6-10	13-68	6-16	13-65	6-22	13-62	6-28	15
16	14-62	6-51	14-59	6-57	14-56	6-64	14-53	6-70	16
17	15-53	6-92	15-50	6-98	15-47	7-05	15-44	7-12	17
18	16-44	7-32	16-41	7-39	16-38	7-46	16-35	7-54	18
19	17-36	7-73	17-32	7-80	17-29	7-88	17-25	7-95	19
20	18-27	8-13	18-24	8-21	18-20	8-29	18-16	8-37	20
21	19-18	8-54	19-15	8-63	19-11	8-71	19-07	8-79	21
22	20-10	8-95	20-06	9-04	20-02	9-12	19-98	9-21	22
23	21-01	9-35	20-97	9-45	20-93	9-54	20-89	9-63	23
24	21-93	9-76	21-88	9-86	21-84	9-95	21-80	10-05	24
25	22-84	10-17	22-79	10-27	22-75	10-37	22-70	10-47	25
26	23-75	10-58	23-71	10-68	23-66	10-78	23-61	10-89	26
27	24-67	10-98	24-62	11-09	24-57	11-20	24-52	11-30	27
28	25-58	11-39	25-53	11-50	25-48	11-61	25-43	11-72	28
29	26-49	11-80	26-44	11-91	26-39	12-03	26-34	12-14	29
30	27-41	12-20	27-35	12-32	27-30	12-44	27-24	12-56	30
31	28-32	12-61	28-26	12-73	28-21	12-86	28-15	12-98	31
32	29-23	13-02	29-18	13-14	29-12	13-27	29-06	13-40	32
33	30-15	13-42	30-09	13-55	30-03	13-68	29-97	13-82	33
34	31-06	13-83	31-00	13-96	30-94	14-10	30-88	14-23	34
35	31-97	14-24	31-91	14-38	31-85	14-51	31-78	14-65	35
36	32-89	14-64	32-82	14-79	32-76	14-93	32-69	15-07	36
37	33-80	15-05	33-74	15-20	33-67	15-34	33-60	15-49	37
38	34-71	15-46	34-65	15-61	34-58	15-76	34-51	15-91	38
39	35-63	15-86	35-56	16-02	35-49	16-17	35-42	16-33	39
40	36-54	16-27	36-47	16-43	36-40	16-59	36-33	16-75	40
41	37-46	16-68	37-38	16-84	37-31	17-00	37-23	17-16	41
42	38-37	17-08	38-29	17-25	38-22	17-42	38-14	17-58	42
43	39-28	17-49	39-21	17-66	39-13	17-83	39-05	18-00	43
44	40-20	17-90	40-12	18-07	40-04	18-25	39-96	18-42	44
45	41-11	18-30	41-03	18-48	40-95	18-66	40-87	18-84	45
46	42-02	18-71	41-94	18-89	41-86	19-08	41-77	19-26	46
47	42-94	19-12	42-85	19-30	42-77	19-49	42-68	19-68	47
48	43-85	19-52	43-76	19-71	43-68	19-91	43-59	20-10	48
49	44-76	19-93	44-68	20-13	44-59	20-32	44-50	20-51	49
50	45-68	20-34	45-59	20-54	45-50	20-73	45-41	20-93	50
Distance.	66 DEG.		65 $\frac{1}{2}$ DEG.		65 $\frac{1}{2}$ DEG.		65 $\frac{1}{4}$ DEG.		Distance.
	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	

Distance.	24 DEG.		24½ DEG.		24¾ DEG.		24½ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	46:59	20:74	46:50	20:95	46:41	21:15	46:32	21:35	51
52	47:50	21:15	47:41	21:36	47:32	21:56	47:23	21:77	52
53	48:42	21:56	48:32	21:77	48:23	21:98	48:13	22:19	53
54	49:33	21:96	49:24	22:18	49:14	22:39	49:04	22:61	54
55	50:24	22:37	50:15	22:59	50:05	22:81	49:95	23:03	55
56	51:16	22:78	51:06	23:00	50:96	23:22	50:86	23:44	56
57	52:07	23:18	51:97	23:41	51:87	23:64	51:76	23:86	57
58	52:99	23:59	52:88	23:82	52:78	21:35	52:67	24:28	58
59	53:90	24:00	53:79	24:23	53:69	24:47	53:58	24:70	59
60	54:81	24:40	54:71	24:64	54:60	24:88	54:49	25:12	60
61	55:73	24:81	55:62	25:05	55:51	25:30	55:40	25:54	61
62	56:64	25:22	56:53	25:46	56:42	25:71	56:30	25:96	62
63	57:55	25:62	57:44	25:88	57:33	26:13	57:21	26:38	63
64	58:47	26:03	58:35	26:29	58:24	26:54	58:12	26:79	64
65	59:38	26:44	59:26	26:70	59:15	26:96	59:03	27:21	65
66	60:29	26:84	60:18	27:11	60:06	27:37	59:94	27:63	66
67	61:21	27:25	61:09	27:52	60:97	27:78	60:85	28:05	67
68	62:12	27:66	62:00	27:93	61:88	28:20	61:75	28:47	68
69	63:03	28:06	62:91	28:34	62:79	28:61	62:66	28:89	69
70	63:95	28:47	63:82	28:75	63:70	29:03	63:57	29:31	70
71	64:86	28:88	64:74	29:16	64:61	29:44	64:48	29:72	71
72	65:78	29:28	65:65	29:57	65:52	29:86	65:39	30:14	72
73	66:69	29:69	66:56	29:98	66:43	30:27	66:29	30:56	73
74	67:60	30:10	67:47	30:39	67:34	30:69	67:20	30:98	74
75	68:52	30:51	68:38	30:80	68:25	31:10	68:11	31:40	75
76	69:43	30:91	69:29	31:21	69:16	31:52	69:02	31:82	76
77	70:34	31:32	70:21	31:63	70:07	31:93	69:93	32:24	77
78	71:26	31:73	71:12	32:04	70:98	32:35	70:84	32:66	78
79	72:17	32:13	72:03	32:45	71:89	32:76	71:74	33:07	79
80	73:08	32:54	72:94	32:86	72:80	33:18	72:65	33:49	80
81	74:00	32:95	73:85	33:27	73:71	33:59	73:56	33:91	81
82	74:91	33:35	74:76	33:68	74:62	34:00	74:47	34:33	82
83	75:82	33:76	75:68	34:09	75:53	34:42	75:38	34:75	83
84	76:74	34:17	76:59	34:50	76:44	34:83	76:28	35:17	84
85	77:65	34:57	77:50	34:91	77:35	35:25	77:19	35:59	85
86	78:56	34:98	78:41	35:32	78:26	35:66	78:10	36:00	86
87	79:48	35:39	79:32	35:73	79:17	36:08	79:01	36:42	87
88	80:39	35:79	80:24	36:14	80:08	36:49	79:92	36:84	88
89	81:31	36:20	81:15	36:55	80:99	36:91	80:82	37:26	89
90	82:22	36:61	82:06	36:96	81:90	37:32	81:73	37:68	90
91	83:13	37:01	82:97	37:38	82:81	37:74	82:64	38:10	91
92	84:05	37:42	83:88	37:79	83:72	38:15	83:55	38:52	92
93	84:96	37:83	84:79	38:20	84:63	38:57	84:46	38:94	93
94	85:87	38:23	85:71	38:61	85:54	38:98	85:37	39:35	94
95	86:79	38:64	86:62	39:02	86:45	39:40	86:27	39:77	95
96	87:70	39:05	87:53	39:43	87:36	39:81	87:18	40:19	96
97	88:61	39:45	88:44	39:84	88:27	40:23	88:09	40:61	97
98	89:53	39:86	89:35	40:25	89:18	40:64	89:00	41:03	98
99	90:44	40:27	90:26	40:66	90:09	41:05	89:91	41:45	99
100	91:35	40:67	91:18	41:07	91:00	41:47	90:81	41:87	100
Distance.	66 DEG.		65¾ DEG.		65½ DEG.		65¼ DEG.		Distance.
	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	

Distance.	25 DEG.		25 $\frac{1}{4}$ DEG.		25 $\frac{1}{2}$ DEG.		25 $\frac{3}{4}$ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	0-91	0-42	0-90	0-43	0-90	0-43	0-90	0-43	1
2	1-81	0-85	1-81	0-85	1-81	0-86	1-80	0-87	2
3	2-72	1-27	2-71	1-28	2-71	1-29	2-70	1-30	3
4	3-63	1-69	3-62	1-71	3-61	1-72	3-60	1-74	4
5	4-53	2-11	4-52	2-13	4-51	2-15	4-50	2-17	5
6	5-44	2-54	5-43	2-56	5-42	2-58	5-40	2-61	6
7	6-34	2-96	6-33	2-99	6-32	3-01	6-30	3-04	7
8	7-25	3-38	7-24	3-41	7-22	3-44	7-21	3-48	8
9	8-16	3-80	8-14	3-84	8-12	3-87	8-11	3-91	9
10	9-06	4-23	9-04	4-27	9-03	4-31	9-01	4-34	10
11	9-97	4-65	9-95	4-69	9-93	4-74	9-91	4-78	11
12	10-88	5-07	10-85	5-12	10-83	5-17	10-81	5-21	12
13	11-78	5-49	11-76	5-55	11-73	5-60	11-71	5-65	13
14	12-69	5-92	12-66	5-97	12-64	6-03	12-61	6-08	14
15	13-59	6-34	13-57	6-40	13-54	6-46	13-51	6-52	15
16	14-50	6-76	14-47	6-83	14-44	6-89	14-41	6-95	16
17	15-41	7-18	15-38	7-25	15-34	7-32	15-31	7-39	17
18	16-31	7-61	16-28	7-68	16-25	7-75	16-21	7-82	18
19	17-22	8-03	17-18	8-10	17-15	8-18	17-11	8-25	19
20	18-13	8-45	18-09	8-53	18-05	8-61	18-01	8-69	20
21	19-03	8-87	18-99	8-96	18-95	9-04	18-91	9-12	21
22	19-94	9-30	19-90	9-38	19-86	9-47	19-82	9-56	22
23	20-85	9-72	20-80	9-81	20-76	9-90	20-72	9-99	23
24	21-75	10-14	21-71	10-24	21-66	10-33	21-62	10-43	24
25	22-66	10-57	22-61	10-66	22-56	10-76	22-52	10-86	25
26	23-56	10-99	23-52	11-09	23-47	11-19	23-42	11-30	26
27	24-47	11-41	24-42	11-52	24-37	11-62	24-32	11-73	27
28	25-38	11-83	25-32	11-94	25-27	12-05	25-22	12-16	28
29	26-28	12-26	26-23	12-37	26-17	12-48	26-12	12-60	29
30	27-19	12-68	27-13	12-80	27-08	12-92	27-02	13-03	30
31	28-10	13-10	28-04	13-22	27-98	13-35	27-92	13-47	31
32	29-00	13-52	28-94	13-65	28-88	13-78	28-82	13-90	32
33	29-91	13-95	29-85	14-08	29-79	14-21	29-72	14-34	33
34	30-81	14-37	30-75	14-50	30-69	14-64	30-62	14-77	34
35	31-72	14-79	31-66	14-93	31-59	15-07	31-52	15-21	35
36	32-63	15-21	32-56	15-36	32-49	15-50	32-43	15-64	36
37	33-53	15-64	33-46	15-78	33-40	15-93	33-33	16-07	37
38	34-44	16-06	34-37	16-21	34-30	16-36	34-23	16-51	38
39	35-35	16-48	35-27	16-64	35-20	16-79	35-13	16-94	39
40	36-25	16-90	36-18	17-06	36-10	17-22	36-03	17-38	40
41	37-16	17-33	37-08	17-49	37-01	17-65	36-93	17-81	41
42	38-06	17-75	37-99	17-92	37-91	18-08	37-83	18-25	42
43	38-97	18-17	38-89	18-34	38-81	18-51	38-73	18-68	43
44	39-88	18-60	39-80	18-77	39-71	18-94	39-63	19-12	44
45	40-78	19-02	40-70	19-20	40-62	19-37	40-53	19-55	45
46	41-69	19-44	41-60	19-62	41-52	19-80	41-43	19-98	46
47	42-60	19-86	42-51	20-05	42-42	20-23	42-33	20-42	47
48	43-50	20-29	43-41	20-48	43-32	20-66	43-23	20-85	48
49	44-41	20-71	44-32	20-90	44-23	21-10	44-13	21-29	49
50	45-32	21-13	45-22	21-33	45-13	21-53	45-03	21-72	50
Distance.	65 DEG.		64 $\frac{1}{4}$ DEG.		64 $\frac{1}{2}$ DEG.		64 $\frac{3}{4}$ DEG.		Distance.
	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	

Distance.	25 DEG.		25 $\frac{1}{2}$ DEG.		25 $\frac{1}{2}$ DEG.		25 $\frac{1}{2}$ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	46-22	21-55	46-13	21-75	46-03	21-96	45-94	22-16	51
52	47-13	21-98	47-03	22-18	46-93	22-39	45-84	22-59	52
53	48-03	22-40	47-94	22-61	47-84	22-82	47-74	23-03	53
54	48-94	22-82	48-84	23-03	48-74	23-25	48-64	23-46	54
55	49-85	23-24	49-74	23-46	49-64	23-68	49-54	23-89	55
56	50-75	23-67	50-65	23-89	50-54	24-11	50-44	24-33	56
57	51-66	24-09	51-55	24-31	51-45	24-54	51-34	24-76	57
58	52-57	24-51	52-46	24-74	52-35	24-97	52-24	25-20	58
59	53-47	24-93	53-36	25-17	53-25	25-40	53-14	25-63	59
60	54-38	25-36	54-27	25-59	54-16	25-83	54-04	26-07	60
61	55-28	25-78	55-17	26-02	55-06	26-26	54-94	26-50	61
62	56-19	26-20	56-08	26-45	55-96	26-69	55-84	26-94	62
63	57-10	26-62	56-98	26-87	56-86	27-12	56-74	27-37	63
64	58-00	27-05	57-89	27-30	57-77	27-55	57-64	27-80	64
65	58-91	27-47	58-79	27-73	58-67	27-98	58-55	28-24	65
66	59-82	27-89	59-69	28-15	59-57	28-41	59-45	28-67	66
67	60-72	28-32	60-60	28-58	60-47	28-84	60-35	29-11	67
68	61-63	28-74	61-50	29-01	61-38	29-27	61-25	29-54	68
69	62-54	29-16	62-41	29-43	62-28	29-71	62-15	29-98	69
70	63-44	29-58	63-31	29-86	63-18	30-14	63-05	30-41	70
71	64-35	30-01	64-22	30-29	64-08	30-57	63-95	30-85	71
72	65-25	30-43	65-12	30-71	64-99	31-00	64-85	31-28	72
73	66-16	30-85	66-03	31-14	65-89	31-43	65-75	31-71	73
74	67-07	31-27	66-93	31-57	66-79	31-86	66-65	32-15	74
75	67-97	31-70	67-83	31-99	67-69	32-29	67-55	32-58	75
76	68-88	32-12	68-74	32-42	68-60	32-72	68-45	33-02	76
77	69-79	32-54	69-64	32-85	69-50	33-15	69-35	33-45	77
78	70-69	32-96	70-55	33-27	70-40	33-58	70-25	33-89	78
79	71-60	33-39	71-45	33-70	71-30	34-01	71-16	34-32	79
80	72-50	33-81	72-36	34-13	72-21	34-44	72-06	34-76	80
81	73-41	34-23	73-26	34-55	73-11	34-87	72-96	35-19	81
82	74-32	34-65	74-17	34-98	74-01	35-30	73-86	35-62	82
83	75-22	35-08	75-07	35-41	74-91	35-73	74-76	36-06	83
84	76-13	35-50	75-97	35-83	75-82	36-16	75-66	36-49	84
85	77-04	35-92	76-88	36-26	76-72	36-59	76-56	36-93	85
86	77-94	36-35	77-78	36-68	77-62	37-02	77-46	37-36	86
87	78-85	36-77	78-69	37-11	78-52	37-45	78-36	37-80	87
88	79-76	37-19	79-59	37-54	79-43	37-88	79-26	38-23	88
89	80-66	37-61	80-50	37-96	80-33	38-32	80-16	38-67	89
90	81-57	38-04	81-40	38-39	81-23	38-75	81-06	39-10	90
91	82-47	38-46	82-31	38-82	82-14	39-18	81-96	39-53	91
92	83-38	38-88	83-21	39-24	83-04	39-61	82-86	39-97	92
93	84-29	39-30	84-11	39-67	83-94	40-04	83-76	40-40	93
94	85-19	39-73	85-02	40-10	84-84	40-47	84-67	40-84	94
95	86-10	40-15	85-92	40-52	85-75	40-90	85-57	41-27	95
96	87-01	40-57	86-83	40-95	86-65	41-33	86-47	41-71	96
97	87-91	40-99	87-73	41-38	87-55	41-76	87-37	42-14	97
98	88-82	41-42	88-64	41-80	87-45	42-19	88-27	42-58	98
99	89-72	41-84	89-54	42-23	89-36	42-62	89-17	43-01	99
100	90-63	42-26	90-45	42-66	90-26	43-05	90-07	43-44	100
Distance.	65 DEG.		64 $\frac{1}{2}$ DEG.		64 $\frac{1}{2}$ DEG.		64 $\frac{1}{2}$ DEG.		Distance.
	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	

Distance.	26 DEG.		26½ DEG.		26½ DEG.		26¾ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	0-90	0-44	0-90	0-44	0-89	0-45	0-89	0-45	1
2	1-80	0-88	1-79	0-88	1-79	0-89	1-79	0-90	2
3	2-70	1-32	2-69	1-33	2-68	1-34	2-68	1-35	3
4	3-60	1-75	3-59	1-77	3-58	1-78	3-57	1-80	4
5	4-49	2-19	4-48	2-21	4-47	2-23	4-46	2-25	5
6	5-39	2-63	5-38	2-65	5-37	2-68	5-36	2-70	6
7	6-29	3-07	6-28	3-10	6-26	3-12	6-25	3-15	7
8	7-19	3-51	7-17	3-54	7-16	3-57	7-14	3-60	8
9	8-09	3-95	8-07	3-98	8-05	4-02	8-04	4-05	9
10	8-99	4-38	8-97	4-42	8-95	4-46	8-93	4-50	10
11	9-89	4-82	9-87	4-87	9-84	4-91	9-82	4-95	11
12	10-79	5-26	10-76	5-31	10-74	5-35	10-72	5-40	12
13	11-68	5-70	11-66	5-75	11-63	5-80	11-61	5-85	13
14	12-58	6-14	12-56	6-19	12-53	6-25	12-50	6-30	14
15	13-48	6-58	13-45	6-63	13-42	6-69	13-39	6-75	15
16	14-38	7-01	14-35	7-08	14-32	7-14	14-29	7-20	16
17	15-28	7-45	15-25	7-52	15-21	7-59	15-18	7-65	17
18	16-18	7-89	16-14	7-96	16-11	8-03	16-07	8-10	18
19	17-08	8-33	17-04	8-40	17-00	8-48	16-97	8-55	19
20	17-98	8-77	17-94	8-85	17-90	8-92	17-86	9-00	20
21	18-87	9-21	18-83	9-29	18-79	9-37	18-75	9-45	21
22	19-77	9-64	19-73	9-73	19-69	9-82	19-65	9-90	22
23	20-67	10-08	20-63	10-17	20-58	10-26	20-54	10-35	23
24	21-57	10-52	21-52	10-61	21-48	10-71	21-43	10-80	24
25	22-47	10-96	22-42	11-06	22-37	11-15	22-32	11-25	25
26	23-37	11-40	23-32	11-50	23-27	11-60	23-22	11-70	26
27	24-27	11-84	24-22	11-94	24-16	12-05	24-11	12-15	27
28	25-17	12-27	25-11	12-38	25-06	12-49	25-00	12-60	28
29	26-06	12-71	26-01	12-83	25-95	12-94	25-90	13-05	29
30	26-96	13-15	26-91	13-27	26-85	13-39	26-79	13-50	30
31	27-86	13-59	27-80	13-71	27-74	13-83	27-68	13-95	31
32	28-76	14-03	28-70	14-15	28-64	14-28	28-58	14-40	32
33	29-66	14-47	29-60	14-60	29-53	14-72	29-47	14-85	33
34	30-56	14-90	30-49	15-04	30-43	15-17	30-36	15-30	34
35	31-46	15-34	31-39	15-48	31-32	15-62	31-25	15-75	35
36	32-36	15-78	32-29	15-92	32-22	16-06	32-15	16-20	36
37	33-26	16-22	33-18	16-36	33-11	16-51	33-04	16-65	37
38	34-15	16-66	34-08	16-81	34-01	16-96	33-93	17-10	38
39	35-05	17-10	34-98	17-25	34-90	17-49	34-83	17-55	39
40	35-95	17-53	35-87	17-69	35-80	17-85	35-72	18-00	40
41	36-85	17-97	36-77	18-13	36-69	18-29	36-61	18-45	41
42	37-75	18-41	37-67	18-58	37-59	18-74	37-51	18-90	42
43	38-65	18-85	38-57	19-02	38-48	19-19	38-40	19-35	43
44	39-55	19-29	39-46	19-46	39-38	19-63	39-29	19-80	44
45	40-45	19-73	40-36	19-90	40-27	20-08	40-18	20-25	45
46	41-34	20-17	41-26	20-35	41-17	20-53	41-08	20-70	46
47	42-24	20-60	42-15	20-79	42-06	20-97	41-97	21-15	47
48	43-14	21-04	43-05	21-23	42-96	21-42	42-86	21-60	48
49	44-04	21-48	43-95	21-67	43-85	21-86	43-76	22-05	49
50	44-94	21-92	44-84	22-11	44-75	22-31	44-65	22-50	50
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	64 DEG.		63½ DEG.		63½ DEG.		63¼ DEG.		

Distance.	26 DEG.		26½ DEG.		26¾ DEG.		26¾ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	45° 84'	22° 36'	45° 74'	22° 56'	45° 64'	22° 76'	45° 54'	22° 96'	51
52	46° 74'	22° 80'	46° 64'	23° 00'	46° 54'	23° 20'	46° 43'	23° 41'	52
53	47° 64'	23° 23'	47° 53'	23° 44'	47° 43'	23° 65'	47° 33'	23° 86'	53
54	48° 53'	23° 67'	48° 43'	23° 88'	48° 33'	24° 09'	48° 22'	24° 31'	54
55	49° 43'	24° 11'	49° 33'	24° 33'	49° 22'	24° 54'	49° 11'	24° 76'	55
56	50° 33'	24° 55'	50° 22'	24° 77'	50° 12'	24° 99'	50° 01'	25° 21'	56
57	51° 23'	24° 99'	51° 12'	25° 21'	51° 01'	25° 43'	50° 50'	25° 63'	57
58	52° 13'	25° 43'	52° 02'	25° 65'	51° 51'	25° 88'	51° 79'	26° 11'	58
59	53° 03'	25° 86'	52° 52'	26° 09'	52° 40'	26° 33'	52° 69'	26° 56'	59
60	53° 53'	26° 30'	53° 41'	26° 54'	53° 30'	26° 77'	53° 58'	27° 01'	60
61	54° 43'	26° 74'	54° 31'	26° 98'	54° 19'	27° 22'	54° 47'	27° 46'	61
62	55° 33'	27° 18'	55° 21'	27° 42'	55° 9'	27° 66'	55° 36'	27° 91'	62
63	56° 23'	27° 62'	56° 10'	27° 86'	56° 38'	28° 11'	56° 26'	28° 36'	63
64	57° 13'	28° 06'	57° 00'	28° 31'	56° 28'	28° 56'	57° 15'	28° 81'	64
65	58° 03'	28° 49'	57° 50'	28° 75'	57° 17'	29° 00'	58° 04'	29° 26'	65
66	58° 53'	28° 93'	59° 19'	29° 19'	59° 07'	29° 45'	58° 54'	29° 71'	66
67	60° 02'	29° 37'	60° 09'	29° 63'	59° 56'	29° 50'	59° 83'	30° 16'	67
68	61° 12'	29° 81'	60° 59'	30° 08'	60° 86'	30° 34'	60° 72'	30° 61'	68
69	62° 02'	30° 25'	61° 88'	30° 52'	61° 75'	30° 79'	61° 62'	31° 06'	69
70	62° 52'	30° 69'	62° 78'	30° 96'	62° 65'	31° 23'	62° 51'	31° 51'	70
71	63° 41'	31° 12'	63° 63'	31° 40'	63° 54'	31° 68'	63° 40'	31° 96'	71
72	64° 31'	31° 56'	64° 57'	31° 84'	64° 44'	32° 13'	64° 29'	32° 41'	72
73	65° 21'	32° 00'	65° 47'	32° 29'	65° 33'	32° 57'	65° 19'	32° 86'	73
74	66° 11'	32° 44'	66° 37'	32° 73'	66° 23'	33° 02'	66° 08'	33° 31'	74
75	67° 01'	32° 88'	67° 27'	33° 17'	67° 12'	33° 46'	66° 57'	33° 76'	75
76	68° 51'	33° 32'	68° 16'	33° 61'	68° 01'	33° 91'	67° 87'	34° 21'	76
77	69° 41'	33° 75'	69° 06'	34° 06'	68° 51'	34° 36'	68° 76'	34° 66'	77
78	70° 31'	34° 19'	69° 56'	34° 50'	69° 40'	34° 80'	69° 65'	35° 11'	78
79	71° 21'	34° 63'	70° 85'	34° 94'	70° 70'	35° 25'	70° 55'	35° 56'	79
80	72° 11'	35° 07'	71° 75'	35° 38'	71° 59'	35° 70'	71° 44'	36° 01'	80
81	73° 01'	35° 51'	72° 65'	35° 83'	72° 49'	36° 14'	72° 33'	36° 46'	81
82	73° 51'	36° 35'	73° 54'	36° 27'	73° 38'	36° 59'	73° 22'	36° 91'	82
83	74° 41'	36° 78'	74° 44'	36° 71'	74° 28'	37° 03'	74° 12'	37° 36'	83
84	75° 31'	36° 82'	75° 34'	37° 15'	75° 17'	37° 48'	75° 01'	37° 81'	84
85	76° 21'	37° 26'	76° 23'	37° 59'	76° 07'	37° 93'	75° 50'	38° 26'	85
86	77° 11'	37° 70'	77° 13'	38° 04'	76° 96'	38° 37'	76° 80'	38° 71'	86
87	78° 01'	38° 14'	78° 03'	38° 48'	77° 86'	38° 82'	77° 69'	39° 16'	87
88	78° 51'	38° 58'	78° 52'	38° 92'	78° 75'	39° 27'	78° 58'	39° 61'	88
89	79° 41'	39° 01'	79° 82'	39° 36'	79° 65'	39° 71'	79° 48'	40° 06'	89
90	80° 31'	39° 45'	80° 72'	39° 81'	80° 54'	40° 16'	80° 37'	40° 51'	90
91	81° 21'	39° 89'	81° 62'	40° 25'	81° 44'	40° 60'	81° 26'	40° 96'	91
92	82° 11'	40° 33'	82° 51'	40° 69'	82° 33'	41° 05'	82° 15'	41° 41'	92
93	83° 01'	40° 77'	83° 41'	41° 13'	83° 23'	41° 50'	83° 05'	41° 86'	93
94	83° 51'	41° 21'	84° 31'	41° 58'	84° 12'	41° 94'	83° 54'	42° 31'	94
95	84° 41'	41° 65'	85° 20'	42° 02'	85° 02'	42° 39'	84° 83'	42° 76'	95
96	85° 31'	42° 08'	86° 10'	42° 46'	85° 51'	42° 83'	85° 73'	43° 21'	96
97	86° 21'	42° 52'	87° 00'	42° 90'	86° 81'	43° 28'	86° 62'	43° 66'	97
98	87° 11'	42° 96'	87° 89'	43° 34'	87° 70'	43° 73'	87° 51'	44° 11'	98
99	88° 01'	43° 40'	88° 79'	43° 79'	88° 60'	44° 17'	88° 40'	44° 56'	99
100	88° 51'	43° 84'	89° 69'	44° 23'	89° 49'	44° 62'	89° 30'	45° 01'	100
Distance.	64 DEG.		63¾ DEG.		63½ DEG.		63¼ DEG.		Distance.
	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	

Distance.	27 DEG.		27½ DEG.		27¾ DEG.		27¾ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	0-89	0-45	0-89	0-46	0-89	0-46	0-88	0-47	1
2	1-78	0-91	1-78	0-92	1-77	0-92	1-77	0-93	2
3	2-67	1-36	2-67	1-37	2-66	1-39	2-65	1-40	3
4	3-56	1-82	3-56	1-83	3-55	1-85	3-54	1-86	4
5	4-45	2-27	4-45	2-29	4-44	2-31	4-42	2-33	5
6	5-35	2-72	5-33	2-75	5-32	2-77	5-31	2-79	6
7	6-24	3-18	6-22	3-21	6-21	3-23	6-19	3-26	7
8	7-13	3-63	7-11	3-66	7-10	3-69	7-08	3-72	8
9	8-02	4-09	8-00	4-12	7-98	4-16	7-96	4-19	9
10	8-91	4-54	8-89	4-58	8-87	4-62	8-85	4-66	10
11	9-80	4-99	9-78	5-04	9-76	5-08	9-73	5-12	11
12	10-69	5-45	10-67	5-49	10-64	5-54	10-62	5-59	12
13	11-58	5-90	11-56	5-95	11-53	6-00	11-50	6-05	13
14	12-47	6-36	12-45	6-41	12-42	6-46	12-39	6-52	14
15	13-37	6-81	13-34	6-87	13-31	6-93	13-27	6-98	15
16	14-26	7-26	14-22	7-33	14-19	7-39	14-16	7-45	16
17	15-15	7-72	15-11	7-78	15-08	7-85	15-04	7-92	17
18	16-04	8-17	16-00	8-24	15-97	8-31	15-93	8-38	18
19	16-93	8-63	16-89	8-70	16-85	8-77	16-81	8-85	19
20	17-82	9-08	17-78	9-16	17-74	9-23	17-70	9-31	20
21	18-71	9-53	18-67	9-62	18-63	9-70	18-58	9-78	21
22	19-60	9-99	19-56	10-07	19-51	10-16	19-47	10-24	22
23	20-49	10-44	20-45	10-53	20-40	10-62	20-35	10-71	23
24	21-38	10-90	21-34	10-99	21-29	11-08	21-24	11-17	24
25	22-28	11-35	22-23	11-45	22-18	11-54	22-12	11-64	25
26	23-17	11-80	23-11	11-90	23-06	12-01	23-01	12-11	26
27	24-06	12-26	24-00	12-36	23-95	12-47	23-89	12-57	27
28	24-95	12-71	24-89	12-82	24-84	12-93	24-78	13-04	28
29	25-84	13-17	25-78	13-28	25-72	13-29	25-66	13-50	29
30	26-73	13-62	26-67	13-74	26-61	13-85	26-55	13-97	30
31	27-62	14-07	27-56	14-19	27-50	14-31	27-43	14-43	31
32	28-51	14-53	28-45	14-65	28-38	14-78	28-32	14-90	32
33	29-40	14-98	29-34	15-11	29-27	15-24	29-20	15-37	33
34	30-29	15-44	30-23	15-57	30-16	15-70	30-09	15-83	34
35	31-19	15-89	31-12	16-03	31-05	16-16	30-97	16-30	35
36	32-08	16-34	32-00	16-48	31-93	16-62	31-86	16-76	36
37	32-97	16-80	32-89	16-94	32-82	17-08	32-74	17-23	37
38	33-86	17-25	33-78	17-40	33-71	17-55	33-63	17-69	38
39	34-75	17-71	34-67	17-86	34-59	18-01	34-51	18-16	39
40	35-64	18-16	35-56	18-31	35-48	18-47	35-40	18-62	40
41	36-53	18-61	36-45	18-77	36-37	18-93	36-28	19-09	41
42	37-42	19-07	37-34	19-23	37-25	19-39	37-17	19-56	42
43	38-31	19-52	38-23	19-69	38-14	19-86	38-05	20-02	43
44	39-20	19-98	39-12	20-15	39-03	20-32	38-94	20-49	44
45	40-10	20-43	40-01	20-60	39-92	20-78	39-82	20-95	45
46	40-99	20-88	40-89	21-06	40-80	21-24	40-71	21-42	46
47	41-88	21-34	41-78	21-52	41-69	21-70	41-59	21-88	47
48	42-77	21-79	42-67	21-98	42-58	22-16	42-48	22-35	48
49	43-66	22-25	43-56	22-44	43-46	22-63	43-36	22-82	49
50	44-55	22-70	44-45	22-89	44-35	23-09	44-25	23-28	50
Distance.	63 DEG.		62¾ DEG.		62¾ DEG.		62¾ DEG.		Distance.
	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	

Distance.	27 DEG.		27 $\frac{1}{4}$ DEG.		27 $\frac{1}{2}$ DEG.		27 $\frac{3}{4}$ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	45:44	23:15	45:34	23:35	45:24	23:55	45:13	23:75	51
52	46:33	23:61	46:23	23:81	46:12	24:01	46:02	24:21	52
53	47:22	24:06	47:12	24:27	47:01	24:47	46:90	24:68	53
54	48:11	24:52	48:01	24:73	47:90	24:93	47:79	25:14	54
55	49:01	24:97	48:90	25:18	48:79	25:40	48:67	25:61	55
56	49:90	25:42	49:78	25:64	49:67	25:86	49:56	26:07	56
57	50:79	25:88	50:67	26:10	50:56	26:32	50:44	26:54	57
58	51:68	26:33	51:56	26:56	51:45	26:78	51:33	27:01	58
59	52:57	26:79	52:45	27:01	52:33	27:24	52:21	27:47	59
60	53:46	27:24	53:34	27:47	53:22	27:70	53:10	27:94	60
61	54:35	27:69	54:23	27:93	54:11	28:17	53:98	28:40	61
62	55:24	28:15	55:12	28:39	54:99	28:63	54:87	28:87	62
63	56:13	28:60	56:01	28:85	55:88	29:09	55:75	29:33	63
64	57:02	29:06	56:90	29:30	56:77	29:55	56:64	29:80	64
65	57:92	29:51	57:79	29:76	57:66	30:01	57:52	30:26	65
66	58:81	29:96	58:68	30:22	58:54	30:48	58:41	30:73	66
67	59:70	30:42	59:56	30:68	59:43	30:94	59:29	31:20	67
68	60:59	30:87	60:45	31:14	60:32	31:40	60:18	31:66	68
69	61:48	31:33	61:34	31:59	61:20	31:86	61:06	32:13	69
70	62:37	31:78	62:23	32:05	62:09	32:32	61:95	32:59	70
71	63:26	32:23	63:12	32:51	62:98	32:78	62:83	33:06	71
72	64:15	32:69	64:01	32:97	63:86	33:25	63:72	33:52	72
73	65:04	33:14	64:90	33:42	64:75	33:71	64:60	33:99	73
74	65:93	33:60	65:79	33:88	65:64	34:17	65:49	34:46	74
75	66:83	34:05	66:68	34:34	66:53	34:63	66:37	34:92	75
76	67:72	34:50	67:57	34:80	67:41	35:09	67:26	35:39	76
77	68:61	34:96	68:45	35:26	68:30	35:55	68:14	35:85	77
78	69:50	35:41	69:34	35:71	69:19	36:02	69:03	36:32	78
79	70:39	35:87	70:23	36:17	70:07	36:48	69:91	36:78	79
80	71:28	36:32	71:12	36:63	70:96	36:94	70:80	37:25	80
81	72:17	36:77	72:01	37:09	71:85	37:40	71:68	37:71	81
82	73:06	37:23	72:90	37:55	72:73	37:86	72:57	38:18	82
83	73:95	37:68	73:79	38:00	73:62	38:33	73:45	38:65	83
84	74:84	38:14	74:68	38:46	74:51	38:79	74:34	39:11	84
85	75:74	38:59	75:57	38:92	75:40	39:25	75:22	39:58	85
86	76:63	39:04	76:46	39:38	76:28	39:71	76:11	40:04	86
87	77:52	39:50	77:34	39:83	77:17	40:17	76:99	40:51	87
88	78:41	39:95	78:23	40:29	78:06	40:63	77:88	40:97	88
89	79:30	40:41	79:12	40:75	78:94	41:10	78:76	41:44	89
90	80:19	40:86	80:01	41:21	79:83	41:56	79:65	41:91	90
91	81:08	41:31	80:90	41:67	80:72	42:02	80:53	42:37	91
92	81:97	41:77	81:79	42:12	81:60	42:48	81:42	42:84	92
93	82:86	42:22	82:68	42:58	82:49	42:94	82:30	43:30	93
94	83:75	42:68	83:57	43:04	83:38	43:40	83:19	43:77	94
95	84:65	43:13	84:46	43:50	84:27	43:87	84:07	44:23	95
96	85:54	43:58	85:35	43:96	85:15	44:23	84:96	44:70	96
97	86:43	44:04	86:23	44:41	86:04	44:79	85:84	45:16	97
98	87:32	44:49	87:12	44:87	86:93	45:25	86:73	45:63	98
99	88:21	44:95	88:01	45:33	87:81	45:71	87:61	46:10	99
100	89:10	45:40	88:90	45:79	88:70	46:17	88:50	46:56	100
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	63 DEG.		62 $\frac{1}{4}$ DEG.		62 $\frac{1}{2}$ DEG.		62 $\frac{3}{4}$ DEG.		

Distance.	28 DEG.		28½ DEG.		28½ DEG.		28½ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	0-88	0-47	0-88	0-47	0-88	0-48	0-88	0-48	1
2	1-77	0-94	1-76	0-95	1-76	0-95	1-75	0-96	2
3	2-65	1-41	2-64	1-42	2-64	1-43	2-63	1-44	3
4	3-53	1-88	3-52	1-89	3-52	1-91	3-51	1-92	4
5	4-41	2-35	4-40	2-37	4-39	2-39	4-38	2-40	5
6	5-30	2-82	5-29	2-84	5-27	2-86	5-26	2-89	6
7	6-18	3-29	6-17	3-31	6-15	3-34	6-14	3-37	7
8	7-06	3-76	7-05	3-79	7-03	3-82	7-01	3-85	8
9	7-95	4-23	7-93	4-26	7-91	4-29	7-89	4-33	9
10	8-83	4-69	8-81	4-73	8-79	4-77	8-77	4-81	10
11	9-71	5-16	9-69	5-21	9-67	5-25	9-64	5-29	11
12	10-60	5-63	10-57	5-68	10-55	5-73	10-52	5-77	12
13	11-48	6-10	11-45	6-15	11-42	6-20	11-40	6-25	13
14	12-36	6-57	12-33	6-63	12-30	6-68	12-27	6-73	14
15	13-24	7-04	13-21	7-10	13-18	7-16	13-15	7-21	15
16	14-13	7-51	14-09	7-57	14-06	7-63	14-03	7-70	16
17	15-01	7-98	14-98	8-05	14-94	8-11	14-90	8-18	17
18	15-89	8-45	15-86	8-52	15-82	8-59	15-78	8-66	18
19	16-78	8-92	16-74	8-99	16-70	9-07	16-66	9-14	19
20	17-66	9-39	17-62	9-47	17-58	9-54	17-53	9-62	20
21	18-54	9-86	18-50	9-94	18-46	10-02	18-41	10-10	21
22	19-42	10-33	19-38	10-41	19-33	10-50	19-29	10-58	22
23	20-31	10-80	20-26	10-89	20-21	10-97	20-16	11-06	23
24	21-19	11-27	21-14	11-36	21-09	11-45	21-04	11-54	24
25	22-07	11-74	22-02	11-83	21-97	11-93	21-92	12-02	25
26	22-96	12-21	22-90	12-31	22-85	12-41	22-79	12-51	26
27	23-84	12-68	23-78	12-78	23-73	12-88	23-67	12-99	27
28	24-72	13-15	24-66	13-25	24-61	13-36	24-55	13-47	28
29	25-61	13-61	25-55	13-73	25-49	13-84	25-43	13-95	29
30	26-49	14-08	26-43	14-20	26-36	14-31	26-30	14-43	30
31	27-37	14-55	27-31	14-67	27-24	14-79	27-18	14-91	31
32	28-25	15-02	28-19	15-15	28-12	15-27	28-06	15-39	32
33	29-14	15-49	29-07	15-62	29-00	15-75	28-93	15-87	33
34	30-02	15-96	29-95	16-09	29-88	16-22	29-81	16-35	34
35	30-90	16-43	30-83	16-57	30-76	16-70	30-69	16-83	35
36	31-79	16-90	31-71	17-04	31-64	17-18	31-56	17-32	36
37	32-67	17-37	32-59	17-51	32-52	17-65	32-44	17-80	37
38	33-55	17-84	33-47	17-99	33-39	18-13	33-32	18-28	38
39	34-43	18-31	34-35	18-46	34-27	18-61	34-19	18-76	39
40	35-32	18-78	35-24	18-93	35-15	19-09	35-07	19-24	40
41	36-20	19-25	36-12	19-41	36-03	19-56	35-95	19-72	41
42	37-08	19-72	37-00	19-88	36-91	20-04	36-82	20-20	42
43	37-97	20-19	37-88	20-35	37-79	20-52	37-70	20-68	43
44	38-85	20-66	38-76	20-83	38-67	20-99	38-58	21-16	44
45	39-73	21-13	39-64	21-30	39-55	21-47	39-45	21-64	45
46	40-62	21-60	40-52	21-77	40-43	21-95	40-33	22-13	46
47	41-50	22-07	41-40	22-25	41-30	22-43	41-21	22-61	47
48	42-38	22-53	42-28	22-72	42-18	22-90	42-08	23-09	48
49	43-26	23-00	43-16	23-19	43-06	23-38	42-96	23-57	49
50	44-15	23-47	44-04	23-67	43-94	23-86	43-84	24-05	50
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	62 DEG.		61½ DEG.		61½ DEG.		61½ DEG.		

Distance.	28 DEG.		28½ DEG.		28¾ DEG.		29¼ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	45°03	23°94	44°93	24°14	44°82	24°34	44°71	24°53	51
52	45°91	24°41	45°81	24°61	45°70	24°81	45°59	25°01	52
53	46°80	24°88	46°69	25°09	46°58	25°29	46°47	25°49	53
54	47°68	25°35	47°57	25°56	47°46	25°77	47°34	25°97	54
55	48°56	25°82	48°45	26°03	48°33	26°24	48°22	26°45	55
56	49°45	26°29	49°33	26°51	49°21	26°72	49°10	26°94	56
57	50°33	26°76	50°21	26°98	50°09	27°20	49°97	27°42	57
58	51°21	27°23	51°09	27°45	50°97	27°68	50°85	27°90	58
59	52°09	27°70	51°97	27°93	51°85	28°15	51°73	28°38	59
60	52°98	28°17	52°85	28°49	52°73	28°63	52°60	28°86	60
61	53°86	28°64	53°73	28°87	53°61	29°11	53°48	29°34	61
62	54°74	29°11	54°62	29°35	54°49	29°58	54°36	29°82	62
63	55°63	29°58	55°50	29°82	55°37	30°06	55°23	30°30	63
64	56°51	30°05	56°38	30°29	56°24	30°54	56°11	30°78	64
65	57°39	30°52	57°26	30°77	57°12	31°02	56°99	31°26	65
66	58°27	30°99	58°14	31°24	58°00	31°49	57°88	31°75	66
67	59°16	31°45	59°02	31°71	58°88	31°97	58°74	32°23	67
68	60°04	31°92	59°90	32°19	59°76	32°45	59°62	32°71	68
69	60°92	32°39	60°78	32°66	60°64	32°92	60°49	33°19	69
70	61°81	32°86	61°66	33°13	61°52	33°40	61°37	33°67	70
71	62°69	33°33	62°54	33°61	62°40	33°88	62°25	34°15	71
72	63°57	33°80	63°42	34°08	63°27	34°36	63°12	34°63	72
73	64°46	34°27	64°30	34°55	64°15	34°83	64°00	35°11	73
74	65°34	34°74	65°19	35°03	65°03	35°31	64°88	35°59	74
75	66°22	35°21	66°07	35°50	65°91	35°79	65°75	36°07	75
76	67°10	35°68	66°95	35°97	66°79	36°26	66°63	36°56	76
77	67°99	36°15	67°83	36°45	67°67	36°74	67°51	37°04	77
78	68°87	36°62	68°71	36°92	68°55	37°22	68°38	37°52	78
79	69°75	37°09	69°59	37°39	69°43	37°70	69°26	38°00	79
80	70°64	37°56	70°47	37°87	70°31	38°17	70°14	38°48	80
81	71°52	38°03	71°35	38°34	71°18	38°65	71°01	38°96	81
82	72°40	38°50	72°23	38°81	72°06	39°13	71°89	39°44	82
83	73°28	38°97	73°11	39°29	72°94	39°60	72°77	39°92	83
84	74°17	39°44	73°99	39°76	73°82	40°08	73°64	40°40	84
85	75°05	39°91	74°88	40°23	74°70	40°56	74°52	40°88	85
86	75°93	40°37	75°76	40°71	75°58	41°04	75°40	41°36	86
87	76°82	40°84	76°64	41°18	76°46	41°51	76°28	41°85	87
88	77°70	41°31	77°52	41°65	77°34	41°99	77°15	42°33	88
89	78°58	41°78	78°40	42°13	78°21	42°47	78°03	42°81	89
90	79°47	42°25	79°28	42°60	79°09	42°94	78°91	43°29	90
91	80°35	42°72	80°16	43°07	79°97	43°42	79°78	43°77	91
92	81°23	43°19	81°04	43°55	80°85	43°90	80°66	44°25	92
93	82°11	43°66	81°92	44°02	81°73	44°38	81°54	44°73	93
94	83°00	44°13	82°80	44°49	82°61	44°85	82°41	45°21	94
95	83°88	44°60	83°68	44°97	83°49	45°33	83°29	45°69	95
96	84°76	45°07	84°57	45°44	84°37	45°81	84°17	46°17	96
97	85°65	45°54	85°45	45°91	85°25	46°28	85°04	46°66	97
98	86°53	46°01	86°33	46°39	86°12	46°76	85°92	47°14	98
99	87°41	46°48	87°21	46°86	87°00	47°24	86°80	47°62	99
100	88°29	46°95	88°09	47°33	87°88	47°72	87°67	48°10	100
Distance.	62 DEG.		61¾ DEG.		61½ DEG.		61¼ DEG.		Distance.
	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	

Distance.	29 DEG.		29 $\frac{1}{4}$ DEG.		29 $\frac{1}{2}$ DEG.		29 $\frac{3}{4}$ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	0-87	0-48	0-87	0-49	0-87	0-49	0-87	0-50	1
2	1-75	0-97	1-74	0-98	1-74	0-98	1-74	0-99	2
3	2-62	1-45	2-62	1-47	2-61	1-48	2-60	1-49	3
4	3-50	1-94	3-49	1-95	3-48	1-97	3-47	1-98	4
5	4-37	2-42	4-36	2-44	4-35	2-46	4-34	2-48	5
6	5-25	2-91	5-23	2-93	5-22	2-95	5-21	2-98	6
7	6-12	3-39	6-11	3-42	6-09	3-45	6-08	3-47	7
8	7-00	3-88	7-98	3-91	7-96	3-94	6-95	3-97	8
9	7-87	4-36	7-85	4-40	7-83	4-43	7-81	4-47	9
10	8-75	4-85	8-72	4-89	8-70	4-92	8-68	4-96	10
11	9-62	5-33	9-60	5-37	9-57	5-52	9-55	5-46	11
12	10-50	5-82	10-47	5-86	10-44	5-91	10-42	5-94	12
13	11-37	6-30	11-34	6-35	11-31	6-40	11-29	6-45	13
14	12-24	6-79	12-21	6-84	12-18	6-89	12-15	6-95	14
15	13-12	7-27	13-09	7-33	13-06	7-39	13-02	7-44	15
16	13-99	7-76	13-96	7-82	13-93	7-88	14-89	7-94	16
17	14-87	8-24	14-83	8-31	14-80	8-37	14-76	8-44	17
18	15-74	8-73	15-70	8-80	15-67	8-86	15-63	8-93	18
19	16-62	9-21	16-58	9-28	16-54	9-36	16-50	9-43	19
20	17-49	9-70	17-45	9-77	17-41	9-85	17-36	9-92	20
21	18-37	10-18	18-32	10-26	18-28	10-34	18-23	10-42	21
22	19-24	10-67	19-19	10-75	19-15	10-83	19-10	10-92	22
23	20-12	11-15	20-07	11-24	20-02	11-33	20-97	11-41	23
24	20-99	11-64	20-94	11-73	20-89	11-82	21-84	11-91	24
25	21-87	12-12	21-81	12-22	21-76	12-31	21-70	12-41	25
26	22-74	12-60	22-68	12-70	22-63	12-80	22-57	12-90	26
27	23-61	13-09	23-56	13-19	23-50	13-30	23-44	13-40	27
28	24-49	13-57	24-43	13-68	24-37	13-79	24-31	13-89	28
29	25-36	14-06	25-30	14-17	25-24	14-28	25-18	14-39	29
30	26-24	14-54	26-17	14-66	26-11	14-77	26-05	14-89	30
31	27-11	15-03	27-05	15-15	26-98	15-27	26-91	15-38	31
32	27-99	15-51	27-92	15-64	27-85	15-76	27-78	15-88	32
33	28-86	16-00	28-79	16-12	28-72	16-25	28-65	16-38	33
34	29-74	16-48	29-66	16-61	29-59	16-74	29-52	16-87	34
35	30-61	16-97	30-54	17-10	30-46	17-23	30-39	17-37	35
36	31-49	17-45	31-41	17-59	31-33	17-73	31-26	17-86	36
37	32-36	17-94	32-28	18-08	32-20	18-22	32-12	18-36	37
38	33-24	18-42	33-15	18-57	33-07	18-71	32-99	18-86	38
39	34-11	18-91	34-03	19-06	33-94	19-20	33-86	19-35	39
40	34-98	19-39	34-90	19-54	34-81	19-70	34-73	19-85	40
41	35-86	19-88	35-77	20-03	35-68	20-19	35-60	20-34	41
42	36-73	20-36	36-64	20-52	36-55	20-68	36-46	20-84	42
43	37-61	20-85	37-52	21-01	37-43	21-17	37-33	21-34	43
44	38-48	21-33	38-39	21-50	38-30	21-67	38-20	21-83	44
45	39-36	21-82	39-26	21-99	39-17	22-16	39-07	22-33	45
46	40-23	22-30	40-13	22-48	40-04	22-65	39-94	22-83	46
47	41-11	22-79	41-01	22-97	40-91	23-14	40-81	23-32	47
48	41-98	23-27	41-88	23-45	41-78	23-63	41-67	23-82	48
49	42-86	23-76	42-75	23-94	42-65	24-13	42-54	24-31	49
50	43-73	24-24	43-62	24-43	43-52	24-62	43-41	24-81	50
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	61 DEG.		60 $\frac{3}{4}$ DEG.		60 $\frac{1}{2}$ DEG.		60 $\frac{1}{4}$ DEG.		

Should be 13 89

Distance.	29 DEG.		29½ DEG.		29½ DEG.		29¾ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	44-61	24-73	44-50	24-92	44-39	25-11	44-28	25-31	51
52	45-48	25-21	45-37	25-41	45-26	25-61	45-15	25-80	52
53	46-35	25-69	46-24	25-90	46-13	26-10	46-01	26-30	53
54	47-23	26-18	47-11	26-39	47-00	26-59	46-88	26-80	54
55	48-10	26-66	47-99	26-87	47-87	27-08	47-75	27-29	55
56	48-98	27-15	48-86	27-36	48-74	27-58	48-62	27-79	56
57	49-85	27-63	49-73	27-85	49-61	28-07	49-49	28-28	57
58	50-73	28-12	50-60	28-34	50-48	28-56	50-36	28-78	58
59	51-60	28-60	51-48	28-83	51-35	29-05	51-22	29-28	59
60	52-48	29-09	52-35	29-32	52-22	29-55	52-09	29-77	60
61	53-35	29-57	53-22	29-81	53-09	30-04	52-96	30-27	61
62	54-23	30-06	54-09	30-29	53-96	30-53	53-83	30-77	62
63	55-10	30-54	54-97	30-78	54-83	31-02	54-70	31-26	63
64	55-98	31-03	55-84	31-27	55-70	31-52	55-56	31-76	64
65	56-85	31-51	56-71	31-76	56-57	32-01	56-43	32-25	65
66	57-72	32-00	57-58	32-25	57-44	32-50	57-30	32-75	66
67	58-60	32-48	58-46	32-74	58-31	32-99	58-17	33-25	67
68	59-47	32-97	59-33	33-23	59-18	33-48	59-04	33-74	68
69	60-35	33-45	60-20	33-71	60-05	33-98	59-91	34-24	69
70	61-22	33-94	61-07	34-20	60-92	34-47	60-77	34-74	70
71	62-10	34-42	61-95	34-69	61-80	34-96	61-64	35-23	71
72	62-97	34-91	62-82	35-18	62-67	35-45	62-51	35-73	72
73	63-85	35-39	63-69	35-67	63-54	35-95	63-38	36-22	73
74	64-72	35-88	64-56	36-16	64-41	36-44	64-25	36-72	74
75	65-60	36-36	65-44	36-65	65-28	36-93	65-11	37-22	75
76	66-47	36-85	66-31	37-14	66-15	37-42	65-98	37-71	76
77	67-35	37-33	67-18	37-62	67-02	37-92	66-85	38-21	77
78	68-22	37-82	68-05	38-11	67-89	38-41	67-72	38-70	78
79	69-09	38-30	68-93	38-60	68-76	38-90	68-59	39-20	79
80	69-97	38-78	69-80	39-09	69-63	39-39	69-46	39-70	80
81	70-84	39-27	70-67	39-58	70-50	39-89	70-32	40-19	81
82	71-72	39-75	71-54	40-07	71-37	40-38	71-19	40-69	82
83	72-59	40-24	72-42	40-56	72-24	40-87	72-06	41-19	83
84	73-47	40-72	73-29	41-04	73-11	41-36	72-93	41-68	84
85	74-34	41-21	74-16	41-53	73-98	41-86	73-80	42-18	85
86	75-22	41-69	75-03	42-02	74-85	42-35	74-67	42-67	86
87	76-09	42-18	75-91	42-51	75-72	42-84	75-53	43-17	87
88	76-97	42-66	76-78	43-00	76-59	43-33	76-40	43-67	88
89	77-84	43-15	77-65	43-49	77-46	43-83	77-27	44-16	89
90	78-72	43-63	78-52	43-98	78-33	44-32	78-14	44-66	90
91	79-59	44-12	79-40	44-46	79-20	44-81	79-01	45-16	91
92	80-46	44-60	80-27	44-95	80-07	45-30	79-87	45-65	92
93	81-34	45-09	81-14	45-44	80-94	45-80	80-74	46-15	93
94	82-21	45-57	82-01	45-93	81-81	46-29	81-61	46-64	94
95	83-09	46-06	82-89	46-42	82-68	46-78	82-48	47-14	95
96	83-96	46-54	83-76	46-91	83-55	47-27	83-35	47-64	96
97	84-84	47-03	84-63	47-40	84-42	47-77	84-22	48-13	97
98	85-71	47-51	85-50	47-88	85-29	48-26	85-08	48-63	98
99	86-59	48-00	86-38	48-37	86-17	48-75	85-95	49-13	99
100	87-46	48-48	87-25	48-86	87-04	49-24	86-82	49-62	100
Distance.	61 DEG.		60¾ DEG.		60½ DEG.		60¼ DEG.		Distance.
	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	

Distance.	30 DEG.		30 $\frac{1}{4}$ DEG.		30 $\frac{1}{2}$ DEG.		30 $\frac{3}{4}$ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	0-87	0-50	0-86	0-50	0-86	0-51	0-86	0-51	1
2	1-73	1-00	1-73	1-01	1-72	1-02	1-72	1-02	2
3	2-60	1-50	2-59	1-51	2-58	1-52	2-58	1-53	3
4	3-46	2-00	3-46	2-02	3-45	2-03	3-44	2-05	4
5	4-33	2-50	4-32	2-52	4-31	2-54	4-30	2-56	5
6	5-20	3-00	5-18	3-02	5-17	3-05	5-16	3-07	6
7	6-06	3-50	6-05	3-53	6-03	3-55	6-02	3-58	7
8	6-93	4-00	6-91	4-03	6-89	4-06	6-88	4-09	8
9	7-79	4-50	7-77	4-53	7-75	4-57	7-73	4-60	9
10	8-66	5-00	8-64	5-04	8-62	5-08	8-59	5-11	10
11	9-53	5-50	9-50	5-54	9-48	5-58	9-45	5-62	11
12	10-39	6-00	10-37	6-05	10-34	6-09	10-31	6-14	12
13	11-26	6-50	11-23	6-55	11-20	6-60	11-17	6-65	13
14	12-12	7-00	12-09	7-05	12-06	7-11	12-03	7-16	14
15	12-99	7-50	12-96	7-56	12-92	7-61	12-89	7-67	15
16	13-86	8-00	13-82	8-06	13-79	8-12	13-75	8-18	16
17	14-72	8-50	14-69	8-56	14-65	8-63	14-61	8-69	17
18	15-59	9-00	15-55	9-07	15-51	9-14	15-47	9-20	18
19	16-45	9-50	16-41	9-57	16-37	9-64	16-33	9-71	19
20	17-32	10-00	17-28	10-08	17-23	10-15	17-19	10-23	20
21	18-19	10-50	18-14	10-58	18-09	10-66	18-05	10-74	21
22	19-05	11-00	19-00	11-08	18-96	11-17	18-91	11-25	22
23	19-92	11-50	19-87	11-59	19-82	11-67	19-77	11-76	23
24	20-78	12-00	20-73	12-09	20-68	12-18	20-63	12-27	24
25	21-65	12-50	21-60	12-59	21-54	12-69	21-49	12-78	25
26	22-52	13-00	22-46	13-10	22-40	13-20	22-34	13-29	26
27	23-38	13-50	23-32	13-60	23-26	13-70	23-20	13-80	27
28	24-25	14-00	24-19	14-11	24-13	14-21	24-06	14-32	28
29	25-11	14-50	25-05	14-61	24-99	14-72	24-92	14-83	29
30	25-98	15-00	25-92	15-11	25-85	15-23	25-78	15-34	30
31	26-85	15-50	26-78	15-62	26-71	15-73	26-64	15-85	31
32	27-71	16-00	27-64	16-12	27-57	16-24	27-50	16-36	32
33	28-58	16-50	28-51	16-62	28-43	16-75	28-36	16-87	33
34	29-44	17-00	29-37	17-13	29-30	17-26	29-22	17-38	34
35	30-31	17-50	30-23	17-63	30-16	17-76	30-08	17-90	35
36	31-18	18-00	31-10	18-14	31-02	18-27	30-94	18-41	36
37	32-04	18-50	31-96	18-64	31-88	18-78	31-80	18-92	37
38	32-91	19-00	32-83	19-14	32-74	19-29	32-66	19-43	38
39	33-77	19-50	33-69	19-65	33-60	19-79	33-52	19-94	39
40	34-64	20-00	34-55	20-15	34-47	20-30	34-38	20-45	40
41	35-51	20-50	35-42	20-65	35-33	20-81	35-24	20-96	41
42	36-37	21-00	36-28	21-16	36-19	21-32	36-10	21-47	42
43	37-24	21-50	37-14	21-66	37-05	21-82	36-95	21-99	43
44	38-11	22-00	38-01	22-17	37-91	22-33	37-81	22-50	44
45	38-97	22-50	38-87	22-67	38-77	22-84	38-67	23-01	45
46	39-84	23-00	39-74	23-17	39-63	23-35	39-53	23-52	46
47	40-70	23-50	40-60	23-68	40-50	23-85	40-39	24-03	47
48	41-57	24-00	41-46	24-18	41-36	24-36	41-25	24-54	48
49	42-44	24-50	42-33	24-68	42-22	24-87	42-11	25-05	49
50	43-30	25-00	43-19	25-19	43-08	25-38	42-97	25-56	50
Distance.	60 DEG.		59 $\frac{1}{4}$ DEG.		59 $\frac{1}{2}$ DEG.		59 $\frac{3}{4}$ DEG.		Distance.
	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	

Distance.	30 DEG.		30 $\frac{1}{2}$ DEG.		30 $\frac{1}{2}$ DEG.		30 $\frac{1}{2}$ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	44°17'	25°50'	44°06'	25°69'	43°94'	25°88'	43°83'	26°08'	51
52	45°03'	26°00'	44°92'	26°20'	44°80'	26°39'	44°69'	26°59'	52
53	45°90'	26°50'	45°78'	26°70'	45°67'	26°90'	45°55'	27°10'	53
54	46°77'	27°00'	46°65'	27°20'	46°53'	27°41'	46°41'	27°61'	54
55	47°63'	27°50'	47°51'	27°71'	47°39'	27°91'	47°27'	28°12'	55
56	48°50'	28°00'	48°37'	28°21'	48°25'	28°42'	48°13'	28°63'	56
57	49°36'	28°50'	49°24'	28°72'	49°11'	28°93'	48°99'	29°14'	57
58	50°23'	29°00'	50°10'	29°22'	49°97'	29°44'	49°85'	29°65'	58
59	51°10'	29°50'	50°97'	29°72'	50°84'	29°94'	50°70'	30°17'	59
60	51°96'	30°00'	51°83'	30°23'	51°70'	30°45'	51°56'	30°68'	60
61	52°83'	30°50'	52°69'	30°73'	52°56'	30°96'	52°42'	31°19'	61
62	53°69'	31°00'	53°56'	31°23'	53°42'	31°47'	53°28'	31°70'	62
63	54°56'	31°50'	54°42'	31°74'	54°28'	31°97'	54°14'	32°21'	63
64	55°43'	32°00'	55°29'	32°24'	55°14'	32°48'	55°00'	32°72'	64
65	56°29'	32°50'	56°15'	32°75'	56°01'	32°99'	55°86'	33°23'	65
66	57°16'	33°00'	57°01'	33°25'	56°87'	33°50'	56°72'	33°75'	66
67	58°02'	33°50'	57°88'	33°75'	57°73'	34°01'	57°58'	34°26'	67
68	58°89'	34°00'	58°74'	34°26'	58°59'	34°51'	58°44'	34°77'	68
69	59°76'	34°50'	59°60'	34°76'	59°45'	35°02'	59°30'	35°28'	69
70	60°62'	35°00'	60°47'	35°26'	60°31'	35°53'	60°16'	35°79'	70
71	61°49'	35°50'	61°33'	35°77'	61°18'	36°04'	61°02'	36°30'	71
72	62°35'	36°00'	62°20'	36°27'	62°04'	36°54'	61°88'	36°81'	72
73	63°22'	36°50'	63°06'	36°78'	62°90'	37°05'	62°74'	37°32'	73
74	64°09'	37°00'	63°92'	37°28'	63°76'	37°56'	63°60'	37°84'	74
75	64°95'	37°50'	64°79'	37°78'	64°62'	38°07'	64°46'	38°35'	75
76	65°82'	38°00'	65°65'	38°29'	65°48'	38°57'	65°31'	38°86'	76
77	66°68'	38°50'	66°52'	38°79'	66°35'	39°08'	66°17'	39°37'	77
78	67°55'	39°00'	67°38'	39°29'	67°21'	39°59'	67°03'	39°88'	78
79	68°42'	39°50'	68°24'	39°80'	68°07'	40°10'	67°89'	40°39'	79
80	69°28'	40°00'	69°11'	40°30'	68°93'	40°60'	68°75'	40°90'	80
81	70°15'	40°50'	69°97'	40°81'	69°79'	41°11'	69°61'	41°41'	81
82	71°01'	41°00'	70°83'	41°31'	70°65'	41°62'	70°47'	41°93'	82
83	71°88'	41°50'	71°70'	41°81'	71°52'	42°13'	71°33'	42°44'	83
84	72°75'	42°00'	72°56'	42°32'	72°38'	42°63'	72°19'	42°95'	84
85	73°61'	42°50'	73°43'	42°82'	73°24'	43°14'	73°05'	43°46'	85
86	74°48'	43°00'	74°29'	43°32'	74°10'	43°65'	73°91'	43°97'	86
87	75°34'	43°50'	75°15'	43°83'	74°96'	44°16'	74°77'	44°48'	87
88	76°21'	44°00'	76°02'	44°33'	75°82'	44°66'	75°63'	44°99'	88
89	77°08'	44°50'	76°88'	44°84'	76°68'	45°17'	76°49'	45°51'	89
90	77°94'	45°00'	77°75'	45°34'	77°55'	45°68'	77°35'	46°02'	90
91	78°81'	45°50'	78°61'	45°84'	78°41'	46°19'	78°21'	46°53'	91
92	79°67'	46°00'	79°47'	46°35'	79°27'	46°69'	79°07'	47°04'	92
93	80°54'	46°50'	80°34'	46°85'	80°13'	47°20'	79°92'	47°55'	93
94	81°41'	47°00'	81°20'	47°35'	80°99'	47°71'	80°78'	48°06'	94
95	82°27'	47°50'	82°06'	47°86'	81°85'	48°22'	81°64'	48°57'	95
96	83°14'	48°00'	82°93'	48°36'	82°72'	48°72'	82°50'	49°08'	96
97	84°00'	48°50'	83°79'	48°87'	83°58'	49°23'	83°36'	49°60'	97
98	84°87'	49°00'	84°66'	49°37'	84°44'	49°74'	84°22'	50°11'	98
99	85°74'	49°50'	85°52'	49°87'	85°30'	50°25'	85°08'	50°62'	99
100	86°60'	50°00'	86°38'	50°38'	86°16'	50°75'	85°94'	51°13'	100
Distance.	60 DEG.		59 $\frac{1}{2}$ DEG.		59 $\frac{1}{2}$ DEG.		59 $\frac{1}{2}$ DEG.		Distance.
	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	

Distance.	31 DEG.		31¼ DEG.		31½ DEG.		31¾ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	0-86	0-51	0-85	0-52	0-85	0-52	0-85	0-53	1
2	1-71	1-03	1-71	1-04	1-71	1-04	1-70	1-05	2
3	2-57	1-55	2-56	1-56	2-56	1-57	2-55	1-58	3
4	3-43	2-06	3-42	2-08	3-41	2-09	3-40	2-10	4
5	4-29	2-58	4-27	2-59	4-26	2-61	4-25	2-63	5
6	5-14	3-09	5-13	3-11	5-12	3-13	5-10	3-16	6
7	6-00	3-61	5-98	3-63	5-97	3-66	5-95	3-68	7
8	6-86	4-12	6-84	4-15	6-82	4-18	6-80	4-21	8
9	7-71	4-64	7-69	4-67	7-67	4-70	7-65	4-74	9
10	8-57	5-15	8-55	5-19	8-53	5-22	8-50	5-26	10
11	9-43	5-67	9-40	5-71	9-38	5-75	9-35	5-79	11
12	10-29	6-18	10-26	6-23	10-23	6-27	10-20	6-31	12
13	11-14	6-70	11-11	6-74	11-08	6-79	11-05	6-84	13
14	12-00	7-21	11-97	7-26	11-94	7-31	11-90	7-37	14
15	12-86	7-73	12-82	7-78	12-79	7-84	12-76	7-89	15
16	13-71	8-24	13-68	8-30	13-64	8-36	13-61	8-42	16
17	14-57	8-76	14-53	8-82	14-49	8-88	14-46	8-95	17
18	15-43	9-27	15-39	9-34	15-35	9-40	15-31	9-47	18
19	16-29	9-79	16-24	9-86	16-20	9-93	16-16	10-00	19
20	17-14	10-30	17-10	10-38	17-05	10-45	17-01	10-52	20
21	18-00	10-82	17-95	10-89	17-91	10-97	17-86	11-05	21
22	18-86	11-33	18-81	11-41	18-76	11-49	18-71	11-58	22
23	19-71	11-85	19-66	11-93	19-61	12-02	19-56	12-10	23
24	20-57	12-36	20-52	12-45	20-46	12-54	20-41	12-63	24
25	21-43	12-88	21-37	12-97	21-32	13-06	21-26	13-16	25
26	22-29	13-39	22-23	13-49	22-17	13-58	22-11	13-68	26
27	23-14	13-91	23-08	14-01	23-02	14-11	22-96	14-21	27
28	24-00	14-42	23-94	14-53	23-87	14-63	23-81	14-73	28
29	24-86	14-94	24-79	15-04	24-73	15-15	24-66	15-26	29
30	25-71	15-45	25-65	15-56	25-58	15-67	25-51	15-79	30
31	26-57	15-97	26-50	16-08	26-43	16-20	26-36	16-31	31
32	27-43	16-48	27-36	16-60	27-28	16-72	27-21	16-84	32
33	28-29	17-00	28-21	17-12	28-14	17-24	28-06	17-37	33
34	29-14	17-51	29-07	17-64	28-99	17-76	28-91	17-89	34
35	30-00	18-03	29-92	18-16	29-84	18-29	29-76	18-42	35
36	30-86	18-54	30-78	18-68	30-70	18-81	30-61	18-94	36
37	31-72	19-06	31-63	19-19	31-55	19-33	31-46	19-47	37
38	32-57	19-57	32-49	19-71	32-40	19-85	32-31	20-00	38
39	33-43	20-09	33-34	20-23	33-25	20-38	33-16	20-52	39
40	34-29	20-60	34-20	20-75	34-11	20-90	34-01	21-05	40
41	35-14	21-12	35-05	21-27	34-96	21-42	34-86	21-57	41
42	36-00	21-63	35-91	21-79	35-81	21-94	35-71	22-10	42
43	36-86	22-15	36-76	22-31	36-66	22-47	36-57	22-63	43
44	37-72	22-66	37-62	22-83	37-52	22-99	37-42	23-15	44
45	38-57	23-18	38-47	23-34	38-37	23-51	38-27	23-68	45
46	39-43	23-69	39-33	23-86	39-22	24-03	39-12	24-21	46
47	40-29	24-21	40-18	24-38	40-07	24-56	39-97	24-73	47
48	41-14	24-72	41-04	24-90	40-93	25-08	40-82	25-26	48
49	42-00	25-24	41-89	25-42	41-78	25-60	41-67	25-78	49
50	42-86	25-75	42-75	25-94	42-63	26-12	42-52	26-31	50
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	59 DEG.		58¾ DEG.		58½ DEG.		58¼ DEG.		

Distance.	31 DEG.		31 $\frac{1}{2}$ DEG.		31 $\frac{1}{2}$ DEG.		31 $\frac{1}{2}$ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	43-72	26-27	43-60	26-46	43-48	26-65	43-37	26-84	51
52	44-57	26-78	44-46	26-93	44-34	27-17	44-22	27-36	52
53	45-43	27-30	45-31	27-49	45-19	27-69	45-07	27-89	53
54	46-29	27-81	46-17	28-01	46-04	28-21	45-92	28-42	54
55	47-14	28-33	47-02	28-53	46-90	28-74	46-77	28-94	55
56	48-00	28-84	47-83	29-05	47-75	29-26	47-62	29-47	56
57	48-86	29-36	48-73	29-57	48-60	29-78	48-47	29-99	57
58	49-72	29-87	49-53	30-09	49-45	30-30	49-32	30-52	58
59	50-57	30-39	50-44	30-61	50-31	30-83	50-17	31-05	59
60	51-43	30-90	51-29	31-13	51-16	31-35	51-02	31-57	60
61	52-29	31-42	52-15	31-65	52-01	31-87	51-87	32-10	61
62	53-14	31-93	53-00	32-16	52-86	32-39	52-72	32-63	62
63	54-00	32-45	53-86	32-68	53-72	32-92	53-57	33-15	63
64	54-86	32-96	54-71	33-20	54-57	33-44	54-42	33-68	64
65	55-72	33-48	55-57	33-72	55-42	33-96	55-27	34-20	65
66	56-57	33-99	56-42	34-24	56-27	34-48	56-12	34-73	66
67	57-43	34-51	57-28	34-76	57-13	35-01	56-98	35-26	67
68	58-29	35-02	58-13	35-28	57-98	35-53	57-82	35-78	68
69	59-14	35-54	58-99	35-80	58-83	36-05	58-67	36-31	69
70	60-00	36-05	59-84	36-31	59-68	36-57	59-52	36-83	70
71	60-86	36-57	60-70	36-83	60-54	37-10	60-37	37-36	71
72	61-72	37-08	61-55	37-35	61-39	37-62	61-23	38-89	72
73	62-57	37-60	62-41	37-87	62-24	38-14	62-08	38-41	73
74	63-43	38-11	63-26	38-39	63-10	38-66	62-93	38-94	74
75	64-29	38-63	64-12	38-91	63-95	39-19	63-78	39-47	75
76	65-14	39-14	64-97	39-43	64-80	39-71	64-63	39-99	76
77	66-00	39-66	65-83	39-95	65-65	40-23	65-43	40-52	77
78	66-86	40-17	66-68	40-46	66-51	40-75	66-33	41-04	78
79	67-72	40-69	67-54	40-98	67-36	41-28	67-18	41-57	79
80	68-57	41-20	68-39	41-50	68-21	41-80	68-03	42-10	80
81	69-43	41-72	69-25	42-02	69-06	42-32	68-88	42-62	81
82	70-29	42-23	70-10	42-54	69-92	42-84	69-73	43-15	82
83	71-14	42-75	70-96	43-06	70-77	43-37	70-58	43-68	83
84	72-00	43-26	71-81	43-58	71-62	43-89	71-43	44-20	84
85	72-86	43-78	72-67	44-10	72-47	44-41	72-28	44-73	85
86	73-72	44-29	73-52	44-61	73-33	44-93	73-13	45-25	86
87	74-57	44-81	74-38	45-13	74-18	45-46	73-98	45-78	87
88	75-43	45-32	75-23	45-65	75-03	45-98	74-83	46-31	88
89	76-29	45-84	76-09	46-17	75-88	46-50	75-68	46-83	89
90	77-15	46-35	76-94	46-69	76-74	47-02	76-53	47-36	90
91	78-00	46-87	77-80	47-21	77-59	47-55	77-38	47-89	91
92	78-86	47-38	78-65	47-73	78-44	48-07	78-23	48-41	92
93	79-72	47-90	79-51	48-25	79-30	48-59	79-08	48-94	93
94	80-57	48-41	80-36	48-76	80-15	49-11	79-93	49-47	94
95	81-43	48-93	81-22	49-28	81-00	49-64	80-78	49-99	95
96	82-29	49-44	82-07	49-80	81-85	50-16	81-63	50-52	96
97	83-15	49-96	82-93	50-32	82-71	50-68	82-48	51-04	97
98	84-00	50-47	83-78	50-84	83-56	51-20	83-33	51-57	98
99	84-86	50-99	84-64	51-36	84-41	51-73	84-18	52-10	99
100	85-72	51-50	85-49	51-88	85-26	52-25	85-04	52-62	100
Distance.	59 DEG.		58 $\frac{1}{2}$ DEG.		58 $\frac{1}{2}$ DEG.		58 $\frac{1}{2}$ DEG.		Distance.
	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	

Distance.	32 DEG.		32½ DEG.		32¾ DEG.		32¾ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	0.85	0.53	0.85	0.53	0.84	0.54	0.84	0.54	1
2	1.70	1.06	1.69	1.07	1.69	1.07	1.68	1.08	2
3	2.54	1.59	2.54	1.60	2.53	1.61	2.52	1.62	3
4	3.39	2.12	3.38	2.13	3.37	2.15	3.36	2.16	4
5	4.24	2.65	4.23	2.67	4.22	2.69	4.21	2.70	5
6	5.09	3.18	5.07	3.20	5.06	3.22	5.05	3.25	6
7	5.94	3.71	5.92	3.74	5.90	3.76	5.89	3.79	7
8	6.78	4.24	6.77	4.27	6.75	4.30	6.73	4.33	8
9	7.63	4.77	7.61	4.80	7.59	4.84	7.57	4.87	9
10	8.48	5.30	8.46	5.34	8.43	5.37	8.41	5.41	10
11	9.33	5.83	9.30	5.87	9.28	5.91	9.25	5.95	11
12	10.18	6.36	10.15	6.40	10.12	6.45	10.09	6.49	12
13	11.02	6.89	10.99	6.94	10.96	6.98	10.93	7.03	13
14	11.87	7.42	11.84	7.47	11.81	7.52	11.77	7.57	14
15	12.72	7.95	12.69	8.00	12.65	8.06	12.62	8.11	15
16	13.57	8.48	13.53	8.54	13.49	8.60	13.46	8.66	16
17	14.42	9.01	14.38	9.07	14.34	9.13	14.30	9.20	17
18	15.26	9.54	15.22	9.61	15.18	9.67	15.14	9.74	18
19	16.11	10.07	16.07	10.14	16.02	10.21	15.98	10.28	19
20	16.96	10.60	16.91	10.67	16.87	10.75	16.82	10.82	20
21	17.81	11.13	17.76	11.21	17.71	11.28	17.66	11.36	21
22	18.66	11.66	18.61	11.74	18.55	11.82	18.50	11.90	22
23	19.51	12.19	19.45	12.27	19.40	12.36	19.34	12.44	23
24	20.35	12.72	20.30	12.81	20.24	12.90	20.18	12.98	24
25	21.20	13.25	21.14	13.34	21.08	13.43	21.03	13.52	25
26	22.05	13.78	21.99	13.87	21.93	13.97	21.87	14.07	26
27	22.90	14.31	22.83	14.41	22.77	14.51	22.71	14.61	27
28	23.75	14.84	23.68	14.94	23.61	15.04	23.55	15.15	28
29	24.59	15.37	24.53	15.47	24.46	15.58	24.39	15.69	29
30	25.44	15.90	25.37	16.01	25.30	16.12	25.23	16.23	30
31	26.29	16.43	26.22	16.54	26.15	16.66	26.07	16.77	31
32	27.14	16.96	27.06	17.08	26.99	17.19	26.91	17.31	32
33	27.99	17.49	27.91	17.61	27.83	17.73	27.75	17.85	33
34	28.83	18.02	28.75	18.14	28.68	18.27	28.60	18.39	34
35	29.68	18.55	29.60	18.68	29.52	18.81	29.44	18.93	35
36	30.53	19.08	30.45	19.21	30.36	19.34	30.28	19.48	36
37	31.38	19.61	31.29	19.74	31.21	19.88	31.12	20.02	37
38	32.23	20.14	32.14	20.28	32.05	20.42	31.96	20.56	38
39	33.07	20.67	32.98	20.81	32.89	20.95	32.80	21.10	39
40	33.92	21.20	33.83	21.34	33.74	21.49	33.64	21.64	40
41	34.77	21.73	34.67	21.88	34.58	22.03	34.48	22.18	41
42	35.62	22.26	35.52	22.41	35.42	22.57	35.32	22.72	42
43	36.47	22.79	36.37	22.95	36.27	23.10	36.16	23.26	43
44	37.31	23.32	37.21	23.48	37.11	23.64	37.01	23.80	44
45	38.16	23.85	38.06	24.01	37.95	24.18	37.85	24.34	45
46	39.01	24.38	38.90	24.55	38.80	24.72	38.69	24.88	46
47	39.86	24.91	39.75	25.08	39.64	25.25	39.53	25.43	47
48	40.71	25.44	40.59	25.61	40.48	25.79	40.37	25.97	48
49	41.55	25.97	41.44	26.15	41.33	26.33	41.21	26.51	49
50	42.40	26.50	42.29	26.68	42.17	26.86	42.05	27.05	50
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	58 DEG.		57¾ DEG.		57½ DEG.		57¼ DEG.		

Distance.	32 DEG.		32 $\frac{1}{4}$ DEG.		32 $\frac{1}{2}$ DEG.		32 $\frac{3}{4}$ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	43-25	27-03	43-13	27-21	43-01	27-40	42-89	27-59	51
52	44-10	27-56	43-98	27-75	43-86	27-94	43-73	28-13	52
53	44-95	28-09	44-82	28-28	44-70	28-48	44-58	28-67	53
54	45-79	28-62	45-67	28-82	45-54	29-01	45-42	29-21	54
55	46-64	29-15	46-51	29-35	46-39	29-55	46-26	29-75	55
56	47-49	29-68	47-36	29-88	47-23	30-09	47-10	30-29	56
57	48-34	30-21	48-21	30-42	48-07	30-63	47-94	30-84	57
58	49-19	30-74	49-05	30-95	48-92	31-16	48-78	31-38	58
59	50-03	31-27	49-90	31-48	49-76	31-70	49-62	31-92	59
60	50-88	31-80	50-74	32-02	50-60	32-24	50-46	32-46	60
61	51-73	32-33	51-59	32-55	51-45	32-78	51-30	33-00	61
62	52-58	32-85	52-44	33-08	52-29	33-31	52-14	33-54	62
63	53-43	33-38	53-28	33-62	53-13	33-85	52-99	34-08	63
64	54-28	33-91	54-13	34-15	53-98	34-39	53-83	34-62	64
65	55-12	34-44	54-97	34-68	54-82	34-92	54-67	35-16	65
66	55-97	34-97	55-82	35-22	55-66	35-46	55-51	35-70	66
67	56-82	35-50	56-66	35-75	56-51	36-00	56-35	36-25	67
68	57-67	36-03	57-51	36-29	57-35	36-54	57-19	36-79	68
69	58-52	36-56	58-36	36-82	58-19	37-07	58-03	37-33	69
70	59-36	37-09	59-20	37-35	59-04	37-61	58-87	37-87	70
71	60-21	37-62	60-05	37-89	59-88	38-15	59-71	38-41	71
72	61-06	38-15	60-89	38-42	60-72	38-69	60-55	38-95	72
73	61-91	38-68	61-74	38-95	61-57	39-22	61-40	39-49	73
74	62-76	39-21	62-58	39-49	62-41	39-76	62-24	40-03	74
75	63-60	39-74	63-43	40-02	63-25	40-30	63-08	40-57	75
76	64-45	40-27	64-28	40-55	64-10	40-83	63-92	41-11	76
77	65-30	40-80	65-12	41-09	64-94	41-37	64-76	41-65	77
78	66-15	41-33	65-97	41-62	65-78	41-91	65-60	42-20	78
79	67-00	41-86	66-81	42-16	66-63	42-45	66-44	42-74	79
80	67-84	42-39	67-66	42-69	67-47	42-98	67-28	43-28	80
81	68-69	42-92	68-50	43-22	68-31	43-52	68-12	43-82	81
82	69-54	43-45	69-35	43-76	69-16	44-06	68-97	44-36	82
83	70-39	43-98	70-20	44-29	70-00	44-60	69-81	44-90	83
84	71-24	44-51	71-04	44-82	70-84	45-13	70-65	45-44	84
85	72-08	45-04	71-89	45-36	71-69	45-67	71-49	45-98	85
86	72-93	45-57	72-73	45-89	72-53	46-21	72-33	46-52	86
87	73-78	46-10	73-58	46-42	73-38	46-75	73-17	47-06	87
88	74-63	46-63	74-42	46-96	74-22	47-28	74-01	47-61	88
89	75-48	47-16	75-27	47-49	75-06	47-82	74-85	48-15	89
90	76-32	47-69	76-12	48-03	75-91	48-36	75-69	48-69	90
91	77-17	48-22	76-96	48-56	76-75	48-89	76-53	49-23	91
92	78-02	48-75	77-81	49-09	77-59	49-43	77-38	49-77	92
93	78-87	49-28	78-65	49-63	78-44	49-97	78-22	50-31	93
94	79-72	49-81	79-50	50-16	79-28	50-51	79-06	50-85	94
95	80-56	50-34	80-34	50-69	80-12	51-04	79-90	51-39	95
96	81-41	50-87	81-19	51-23	80-97	51-58	80-74	51-93	96
97	82-26	51-40	82-04	51-76	81-81	52-12	81-58	52-47	97
98	83-11	51-93	82-88	52-29	82-65	52-66	82-42	53-02	98
99	83-96	52-46	83-73	52-83	83-50	53-19	83-26	53-56	99
100	84-80	52-99	84-57	53-36	84-34	53-73	84-10	54-10	100
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	58 DEG.		57 $\frac{3}{4}$ DEG.		57 $\frac{1}{2}$ DEG.		57 $\frac{1}{4}$ DEG.		

Distance.	33 DEG.		33½ DEG.		33½ DEG.		33¾ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	0-84	0-54	0-84	0-55	0-83	0-55	0-83	0-56	1
2	1-68	1-09	1-67	1-10	1-67	1-10	1-66	1-11	2
3	2-52	1-63	2-51	1-64	2-50	1-66	2-49	1-67	3
4	3-35	2-18	3-35	2-19	3-34	2-21	3-33	2-22	4
5	4-19	2-72	4-18	2-74	4-17	2-76	4-16	2-78	5
6	5-03	3-27	5-02	3-29	5-00	3-31	4-99	3-33	6
7	5-87	3-81	5-85	3-84	5-84	3-86	5-82	3-89	7
8	6-71	4-36	6-69	4-39	6-67	4-42	6-65	4-44	8
9	7-55	4-90	7-53	4-93	7-50	4-97	7-48	5-00	9
10	8-39	5-45	8-36	5-48	8-34	5-52	8-31	5-56	10
11	9-23	5-99	9-20	6-03	9-17	6-07	9-15	6-11	11
12	10-06	6-54	10-04	6-58	10-01	6-62	9-98	6-67	12
13	10-90	7-08	10-87	7-13	10-84	7-18	10-81	7-22	13
14	11-74	7-62	11-71	7-68	11-67	7-73	11-64	7-78	14
15	12-58	8-17	12-54	8-22	12-51	8-28	12-47	8-33	15
16	13-42	8-71	13-38	8-77	13-34	8-83	13-30	8-89	16
17	14-26	9-26	14-22	9-32	14-18	9-38	14-13	9-44	17
18	15-10	9-80	15-05	9-87	15-01	9-93	14-97	10-00	18
19	15-93	10-35	15-89	10-42	15-84	10-49	15-80	10-56	19
20	16-77	10-89	16-73	10-97	16-68	11-04	16-63	11-11	20
21	17-61	11-44	17-56	11-51	17-51	11-59	17-46	11-67	21
22	18-45	11-98	18-40	12-06	18-35	12-14	18-29	12-22	22
23	19-29	12-53	19-23	12-61	19-18	12-69	19-12	12-78	23
24	20-13	13-07	20-07	13-16	20-01	13-25	19-96	13-33	24
25	20-97	13-62	20-91	13-71	20-85	13-80	20-79	13-89	25
26	21-81	14-16	21-74	14-26	21-68	14-35	21-62	14-44	26
27	22-64	14-71	22-58	14-80	22-51	14-90	22-45	15-00	27
28	23-48	15-25	23-42	15-35	23-35	15-45	23-28	15-56	28
29	24-32	15-79	24-25	15-90	24-18	16-01	24-11	16-11	29
30	25-16	16-34	25-09	16-45	25-02	16-56	24-94	16-67	30
31	26-00	16-88	25-92	17-00	25-85	17-11	25-78	17-22	31
32	26-84	17-43	26-76	17-55	26-68	17-66	26-61	17-78	32
33	27-68	17-97	27-60	18-09	27-52	18-21	27-44	18-33	33
34	28-51	18-52	28-43	18-64	28-35	18-77	28-27	18-89	34
35	29-35	19-06	29-27	19-19	29-19	19-32	29-10	19-44	35
36	30-19	19-61	30-11	19-74	30-02	19-87	29-93	20-00	36
37	31-03	20-15	30-94	20-29	30-85	20-42	30-76	20-56	37
38	31-87	20-70	31-78	20-84	31-69	20-97	31-60	21-11	38
39	32-71	21-24	32-62	21-38	32-52	21-53	32-43	21-67	39
40	33-55	21-79	33-45	21-93	33-36	22-08	33-26	22-22	40
41	34-39	22-33	34-29	22-48	34-19	22-63	34-09	22-78	41
42	35-22	22-87	35-12	23-03	35-02	23-18	34-92	23-33	42
43	36-06	23-42	35-96	23-58	35-86	23-73	35-75	23-89	43
44	36-90	23-96	36-80	24-12	36-69	24-29	36-58	24-45	44
45	37-74	24-51	37-63	24-67	37-52	24-84	37-42	25-00	45
46	38-58	25-05	38-47	25-22	38-36	25-39	38-25	25-56	46
47	39-42	25-60	39-31	25-77	39-19	25-94	39-08	26-11	47
48	40-26	26-14	40-14	26-32	40-03	26-49	39-91	26-67	48
49	41-09	26-69	40-98	26-87	40-86	27-04	40-74	27-22	49
50	41-93	27-23	41-81	27-41	41-69	27-60	41-57	27-78	50
Distance.	57 DEG.		56¾ DEG.		56½ DEG.		56¼ DEG.		Distance.
	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	

Distance.	33 DEG.		33 $\frac{1}{2}$ DEG.		33 $\frac{1}{2}$ DEG.		33 $\frac{3}{4}$ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	42-77	27-78	42-65	27-96	42-53	28-15	42-40	28-33	51
52	43-61	28-32	43-49	28-51	43-36	28-70	43-24	28-89	52
53	44-45	28-87	44-32	29-06	44-20	29-25	44-07	29-45	53
54	45-29	29-41	45-16	29-61	45-03	29-80	44-90	30-00	54
55	46-13	29-96	46-00	30-16	45-86	30-36	45-73	30-56	55
56	46-97	30-50	46-83	30-70	46-70	30-91	46-56	31-11	56
57	47-80	31-04	47-67	31-25	47-53	31-46	47-39	31-67	57
58	48-64	31-59	48-50	31-89	48-37	32-01	48-23	32-22	58
59	49-48	32-13	49-34	32-35	49-20	32-56	49-06	32-78	59
60	50-32	32-68	50-18	32-90	50-03	33-12	49-89	33-33	60
61	51-16	33-22	51-01	33-45	50-87	33-67	50-72	33-89	61
62	52-00	33-77	51-85	33-99	51-70	34-22	51-55	34-45	62
63	52-84	34-31	52-69	34-54	52-53	34-77	52-38	35-00	63
64	53-67	34-86	53-52	35-09	53-37	35-32	53-21	35-56	64
65	54-51	35-40	54-36	35-64	54-20	35-88	54-05	36-11	65
66	55-35	35-95	55-19	36-19	55-04	36-43	54-88	36-67	66
67	56-19	36-49	56-03	36-74	55-87	36-98	55-71	37-22	67
68	57-03	37-04	56-87	37-28	56-70	37-53	56-54	37-78	68
69	57-87	37-58	57-70	37-83	57-54	38-08	57-37	38-33	69
70	58-71	38-12	58-54	38-38	58-37	38-64	58-20	38-89	70
71	59-55	38-67	59-38	38-93	59-21	39-19	59-03	39-45	71
72	60-38	39-21	60-21	39-48	60-04	39-74	59-87	40-00	72
73	61-22	39-76	61-05	40-03	60-87	40-29	60-70	40-56	73
74	62-06	40-30	61-89	40-57	61-71	40-84	61-53	41-11	74
75	62-90	40-85	62-72	41-12	62-54	41-40	62-36	41-67	75
76	63-74	41-39	63-56	41-67	63-38	41-95	63-19	42-22	76
77	64-58	41-94	64-39	42-22	64-21	42-50	64-02	42-78	77
78	65-42	42-48	65-23	42-77	65-04	43-05	64-85	43-33	78
79	66-25	43-03	66-07	43-32	65-88	43-60	65-69	43-89	79
80	67-09	43-57	66-90	43-86	66-71	44-15	66-52	44-45	80
81	67-93	44-12	67-74	44-41	67-54	44-71	67-35	45-00	81
82	68-77	44-66	68-58	44-96	68-38	45-26	68-18	45-56	82
83	69-61	45-20	69-41	45-51	69-21	45-81	69-01	46-11	83
84	70-45	45-75	70-25	46-06	70-05	46-36	69-84	46-67	84
85	71-29	46-29	71-08	46-60	70-88	46-91	70-67	47-22	85
86	72-13	46-84	71-92	47-15	71-71	47-47	71-51	47-78	86
87	72-96	47-38	72-76	47-70	72-55	48-02	72-34	48-33	87
88	73-80	47-93	73-59	48-25	73-38	48-57	73-17	48-89	88
89	74-64	48-47	74-43	48-80	74-22	49-12	74-00	49-45	89
90	75-48	49-02	75-27	49-35	75-05	49-67	74-83	50-00	90
91	76-32	49-56	76-10	49-89	75-88	50-23	75-66	50-56	91
92	77-16	50-11	76-94	50-44	76-72	50-78	76-50	51-11	92
93	78-00	50-65	77-77	50-99	77-55	51-33	77-33	51-67	93
94	78-83	51-20	78-61	51-54	78-39	51-88	78-16	52-22	94
95	79-67	51-74	79-45	52-09	79-22	52-43	78-99	52-78	95
96	80-51	52-29	80-28	52-64	80-05	52-99	79-82	53-33	96
97	81-35	52-83	81-12	53-18	80-89	53-54	80-65	53-89	97
98	82-19	53-37	81-96	53-73	81-72	54-09	81-48	54-45	98
99	83-03	53-92	82-79	54-28	82-55	54-64	82-32	55-00	99
100	83-87	54-46	83-63	54-83	83-39	55-19	83-15	55-56	100
Distance.	57 DEG.		56 $\frac{1}{2}$ DEG.		56 $\frac{1}{2}$ DEG.		56 $\frac{1}{4}$ DEG.		Distance.
	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	

Distance.	34 DEG.		34 $\frac{1}{2}$ DEG.		34 $\frac{1}{2}$ DEG.		34 $\frac{1}{2}$ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	0-83	0-56	0-83	0-56	0-82	0-57	0-82	0-57	1
2	1-66	1-12	1-65	1-13	1-65	1-13	1-64	1-14	2
3	2-49	1-68	2-48	1-69	2-47	1-70	2-46	1-71	3
4	3-32	2-24	3-31	2-25	3-30	2-27	3-29	2-28	4
5	4-15	2-80	4-13	2-81	4-12	2-83	4-11	2-85	5
6	4-97	3-36	4-96	3-38	4-94	3-40	4-93	3-42	6
7	5-80	3-91	5-79	3-94	5-77	3-96	5-75	3-99	7
8	6-63	4-47	6-61	4-50	6-59	4-53	6-57	4-56	8
9	7-46	5-03	7-44	5-07	7-42	5-10	7-39	5-13	9
10	8-29	5-59	8-27	5-63	8-24	5-66	8-22	5-70	10
11	9-12	6-15	9-09	6-19	9-07	6-23	9-04	6-27	11
12	9-95	6-71	9-92	6-75	9-89	6-80	9-86	6-84	12
13	10-78	7-27	10-75	7-32	10-71	7-36	10-68	7-41	13
14	11-61	7-83	11-57	7-88	11-54	7-93	11-50	7-98	14
15	12-44	8-39	12-40	8-44	12-36	8-50	12-32	8-55	15
16	13-26	8-95	13-23	9-00	13-19	9-06	13-15	9-12	16
17	14-09	9-51	14-05	9-57	14-01	9-63	13-97	9-69	17
18	14-92	10-07	14-88	10-13	14-83	10-20	14-79	10-26	18
19	15-75	10-62	15-71	10-69	15-66	10-76	15-61	10-83	19
20	16-58	11-18	16-53	11-26	16-48	11-33	16-43	11-40	20
21	17-41	11-74	17-36	11-82	17-31	11-89	17-25	11-97	21
22	18-24	12-30	18-18	12-38	18-13	12-46	18-08	12-54	22
23	19-07	12-86	19-01	12-94	18-95	13-03	18-90	13-11	23
24	19-90	13-42	19-84	13-51	19-78	13-59	19-72	13-68	24
25	20-73	13-98	20-66	14-07	20-60	14-16	20-54	14-25	25
26	21-55	14-54	21-49	14-63	21-43	14-73	21-36	14-82	26
27	22-38	15-10	22-32	15-20	22-25	15-29	22-18	15-39	27
28	23-21	15-66	23-14	15-76	23-08	15-86	23-01	15-96	28
29	24-04	16-22	23-97	16-32	23-90	16-44	23-83	16-53	29
30	24-87	16-78	24-80	16-88	24-72	16-99	24-65	17-10	30
31	25-70	17-33	25-62	17-45	25-55	17-56	25-47	17-67	31
32	26-53	17-89	26-45	18-01	26-37	18-12	26-29	18-24	32
33	27-36	18-45	27-28	18-57	27-20	18-69	27-11	18-81	33
34	28-19	19-01	28-10	19-14	28-02	19-26	27-94	19-38	34
35	29-02	19-57	28-93	19-70	28-84	19-82	28-76	19-95	35
36	29-85	20-13	29-76	20-26	29-67	20-39	29-58	20-52	36
37	30-67	20-69	30-58	20-82	30-49	20-96	30-40	21-09	37
38	31-50	21-25	31-41	21-39	31-32	21-52	31-22	21-66	38
39	32-33	21-81	32-24	21-95	32-14	22-09	32-04	22-23	39
40	33-16	22-37	33-06	22-51	32-97	22-66	32-87	22-80	40
41	33-99	22-93	33-89	23-07	33-79	23-22	33-69	23-37	41
42	34-82	23-49	34-72	23-64	34-61	23-79	34-51	23-94	42
43	35-65	24-05	35-54	24-20	35-44	24-36	35-33	24-51	43
44	36-48	24-60	36-37	24-76	36-26	24-92	36-15	25-08	44
45	37-31	25-16	37-20	25-33	37-09	25-49	36-97	25-65	45
46	38-14	25-72	38-02	25-89	37-91	26-05	37-80	26-22	46
47	38-96	26-28	38-85	26-45	38-73	26-62	38-62	26-79	47
48	39-79	26-84	39-68	27-01	39-56	27-19	39-44	27-36	48
49	40-62	27-40	40-50	27-58	40-38	27-75	40-26	27-93	49
50	41-45	27-96	41-33	28-14	41-21	28-32	41-08	28-50	50
Distance.	56 DEG.		55 $\frac{1}{2}$ DEG.		55 $\frac{1}{2}$ DEG.		55 $\frac{1}{2}$ DEG.		Distance.
	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	

Distance.	34 DEG.		34 $\frac{1}{2}$ DEG.		34 $\frac{1}{2}$ DEG.		34 $\frac{1}{2}$ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	42-28	28-52	42-16	28-70	42-03	28-89	41-90	29-07	51
52	43-11	29-08	42-98	29-27	42-85	29-45	42-73	29-64	52
53	43-94	29-64	43-81	29-83	43-68	30-02	43-55	30-21	53
54	44-77	30-20	44-64	30-39	44-50	30-59	44-37	30-78	54
55	45-60	30-76	45-46	30-95	45-33	31-15	45-19	31-35	55
56	46-43	31-31	46-29	31-52	46-15	31-72	46-01	31-92	56
57	47-26	31-87	47-12	32-08	46-98	32-29	46-83	32-49	57
58	48-08	32-43	47-94	32-64	47-80	32-85	47-66	33-06	58
59	48-91	32-99	48-77	33-21	48-62	33-42	48-48	33-63	59
60	49-74	33-55	49-60	33-77	49-45	33-98	49-30	34-20	60
61	50-57	34-11	50-42	34-33	50-27	34-55	50-12	34-77	61
62	51-40	34-67	51-25	34-89	51-10	35-12	50-94	35-34	62
63	52-23	35-23	52-08	35-46	51-92	35-68	51-76	35-91	63
64	53-06	35-79	52-90	36-02	52-74	36-25	52-59	36-48	64
65	53-89	36-35	53-73	36-58	53-57	36-82	53-41	37-05	65
66	54-72	36-91	54-55	37-15	54-39	37-38	54-23	37-62	66
67	55-55	37-46	55-38	37-71	55-22	37-95	55-05	38-19	67
68	56-37	38-03	56-21	38-27	56-04	38-52	55-87	38-76	68
69	57-20	38-58	57-03	38-83	56-86	39-08	56-69	39-33	69
70	58-03	39-14	57-86	39-40	57-69	39-65	57-52	39-90	70
71	58-86	39-70	58-69	39-96	58-51	40-21	58-34	40-47	71
72	59-69	40-26	59-51	40-52	59-34	40-78	59-16	41-04	72
73	60-52	40-82	60-34	41-08	60-16	41-35	59-98	41-61	73
74	61-35	41-38	61-17	41-65	60-99	41-91	60-80	42-18	74
75	62-18	41-94	61-99	42-21	61-81	42-48	61-62	42-75	75
76	63-01	42-50	62-82	42-77	62-63	43-05	62-45	43-32	76
77	63-84	43-06	63-65	43-34	63-46	43-61	63-27	43-89	77
78	64-66	43-62	64-47	43-90	64-28	44-18	64-09	44-46	78
79	65-49	44-18	65-30	44-46	65-11	44-75	64-91	45-03	79
80	66-32	44-74	66-13	45-02	65-93	45-31	65-73	45-60	80
81	67-15	45-29	66-95	45-59	66-75	45-88	66-55	46-17	81
82	67-98	45-85	67-78	46-15	67-58	46-45	67-37	46-74	82
83	68-81	46-41	68-61	46-71	68-40	47-01	68-20	47-31	83
84	69-64	46-97	69-43	47-28	69-23	47-58	69-02	47-88	84
85	70-47	47-53	70-26	47-84	70-05	48-14	69-84	48-45	85
86	71-30	48-09	71-09	48-40	70-87	48-71	70-66	49-02	86
87	72-13	48-65	71-91	48-96	71-70	49-28	71-48	49-59	87
88	72-96	49-21	72-74	49-53	72-52	49-84	72-30	50-16	88
89	73-78	49-77	73-57	50-09	73-35	50-41	73-13	50-73	89
90	74-61	50-33	74-39	50-65	74-17	50-98	73-95	51-30	90
91	75-44	50-89	75-22	51-22	75-00	51-54	74-77	51-87	91
92	76-27	51-45	76-05	51-78	75-82	52-11	75-59	52-44	92
93	77-10	52-00	76-87	52-34	76-64	52-68	76-41	53-01	93
94	77-93	52-56	77-70	52-90	77-47	53-24	77-23	53-58	94
95	78-76	53-12	78-53	53-47	78-29	53-81	78-06	54-15	95
96	79-59	53-68	79-35	54-03	79-12	54-37	78-88	54-72	96
97	80-42	54-24	80-18	54-59	79-94	54-94	79-70	55-29	97
98	81-25	54-80	81-01	55-15	80-76	55-51	80-52	55-86	98
99	82-07	55-36	81-83	55-72	81-59	56-07	81-34	56-43	99
100	82-90	55-92	82-66	56-28	82-41	56-64	82-16	57-00	100
Distance.	56 DEG.		55 $\frac{1}{2}$ DEG.		55 $\frac{1}{2}$ DEG.		55 $\frac{1}{2}$ DEG.		Distance.
	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	

Distance.	35 DEG.		35½ DEG.		35½ DEG.		35½ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	0-82	0-57	0-82	0-58	0-81	0-58	0-81	0-58	1
2	1-64	1-15	1-63	1-15	1-63	1-16	1-62	1-17	2
3	2-46	1-72	2-45	1-73	2-44	1-74	2-43	1-75	3
4	3-28	2-29	3-27	2-31	3-26	2-32	3-25	2-34	4
5	4-10	2-87	4-08	2-89	4-07	2-90	4-06	2-92	5
6	4-91	3-44	4-90	3-46	4-88	3-48	4-87	3-51	6
7	5-73	4-01	5-72	4-04	5-70	4-06	5-68	4-09	7
8	6-55	4-59	6-53	4-62	6-51	4-65	6-49	4-67	8
9	7-37	5-16	7-35	5-19	7-33	5-23	7-30	5-26	9
10	8-19	5-74	8-17	5-77	8-14	5-81	8-12	5-84	10
11	9-01	6-31	8-98	6-35	8-96	6-39	8-93	6-43	11
12	9-83	6-88	9-80	6-93	9-77	6-97	9-74	7-01	12
13	10-65	7-46	10-62	7-50	10-58	7-55	10-55	7-60	13
14	11-47	8-03	11-43	8-08	11-40	8-13	11-36	8-18	14
15	12-29	8-60	12-25	8-66	12-21	8-71	12-17	8-76	15
16	13-11	9-18	13-07	9-23	13-03	9-29	12-99	9-35	16
17	13-93	9-75	13-88	9-81	13-84	9-87	13-80	9-93	17
18	14-74	10-32	14-70	10-39	14-65	10-45	14-61	10-52	18
19	15-56	10-90	15-52	10-97	15-47	11-03	15-42	11-10	19
20	16-38	11-47	16-33	11-54	16-28	11-61	16-23	11-68	20
21	17-20	12-05	17-15	12-12	17-10	12-19	17-04	12-27	21
22	18-02	12-62	17-97	12-70	17-01	12-78	17-85	12-85	22
23	18-84	13-19	18-78	13-27	18-72	13-36	18-67	13-44	23
24	19-66	13-77	19-60	13-85	19-54	13-94	19-48	14-02	24
25	20-48	14-34	20-42	14-43	20-35	14-52	20-29	14-61	25
26	21-30	14-91	21-23	15-01	21-17	15-10	21-10	15-19	26
27	22-12	15-49	22-05	15-58	21-98	15-68	21-91	15-77	27
28	22-94	16-06	22-87	16-16	22-80	16-26	22-72	16-36	28
29	23-76	16-63	23-68	16-74	23-61	16-84	23-54	16-94	29
30	24-57	17-21	24-50	17-31	24-42	17-42	24-35	17-53	30
31	25-39	17-78	25-32	17-89	25-24	18-00	25-16	18-11	31
32	26-21	18-35	26-13	18-47	26-05	18-58	25-97	18-70	32
33	27-03	18-93	26-95	19-05	26-87	19-16	26-78	19-28	33
34	27-85	19-50	27-77	19-62	27-68	19-74	27-59	19-86	34
35	28-67	20-08	28-58	20-20	28-49	20-32	28-41	20-45	35
36	29-49	20-65	29-40	20-78	29-31	20-91	29-22	21-03	36
37	30-31	21-22	30-22	21-35	30-12	21-49	30-03	21-62	37
38	31-13	21-80	31-03	21-93	30-94	22-07	30-84	22-20	38
39	31-95	22-37	31-85	22-51	31-75	22-65	31-65	22-79	39
40	32-77	22-94	32-67	23-09	32-56	23-23	32-46	23-37	40
41	33-59	23-52	33-48	23-66	33-38	23-81	33-27	23-95	41
42	34-40	24-09	34-30	24-24	34-19	24-39	34-09	24-54	42
43	35-22	24-66	35-12	24-82	35-01	24-97	34-90	25-12	43
44	36-04	25-24	35-93	25-39	35-82	25-55	35-71	25-71	44
45	36-86	25-81	36-75	25-97	36-64	26-13	36-52	26-29	45
46	37-68	26-38	37-57	26-55	37-45	26-71	37-33	26-88	46
47	38-50	26-96	38-38	27-13	38-26	27-29	38-14	27-46	47
48	39-32	27-53	39-20	27-70	39-08	27-87	38-96	28-04	48
49	40-14	28-11	40-02	28-28	39-89	28-45	39-77	28-63	49
50	40-96	28-68	40-83	28-86	40-71	29-04	40-58	29-21	50
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	55 DEG.		54½ DEG.		54½ DEG.		54½ DEG.		

Distance.	35 DEG.		35 $\frac{1}{4}$ DEG.		35 $\frac{1}{2}$ DEG.		35 $\frac{3}{4}$ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	41-78	29-25	41-65	29-43	41-52	29-62	41-39	29-80	51
52	42-60	29-33	42-47	30-01	42-33	30-20	42-20	30-38	52
53	43-42	30-40	43-28	30-59	43-15	30-78	43-01	30-97	53
54	44-23	30-97	44-10	31-17	43-96	31-36	43-82	31-55	54
55	45-05	31-55	44-92	31-74	44-78	31-94	44-64	32-13	55
56	45-87	32-12	45-73	32-32	45-59	32-52	45-45	32-72	56
57	46-69	32-69	46-55	32-90	46-40	33-10	46-26	33-30	57
58	47-51	33-27	47-37	33-47	47-22	33-68	47-07	33-89	58
59	48-33	33-84	48-18	34-05	48-03	34-26	47-88	34-47	59
60	49-15	34-41	49-00	34-63	48-85	34-84	48-69	35-05	60
61	49-97	34-99	49-82	35-21	49-66	35-42	49-51	35-64	61
62	50-79	35-56	50-63	35-78	50-48	36-00	50-32	36-22	62
63	51-61	36-14	51-45	36-56	51-29	36-58	51-13	36-81	63
64	52-43	36-71	52-27	36-94	52-19	37-16	51-94	37-39	64
65	53-24	37-28	53-08	37-51	52-92	37-75	52-75	37-98	65
66	54-06	37-86	53-90	38-09	53-73	38-33	53-56	38-56	66
67	54-88	38-43	54-71	38-67	54-55	38-91	54-38	39-14	67
68	55-70	39-00	55-53	39-25	55-36	39-49	55-19	39-73	68
69	56-52	39-58	56-35	39-82	56-17	40-07	56-00	40-31	69
70	57-34	40-15	57-16	40-40	56-99	40-65	56-81	40-90	70
71	58-16	40-72	57-98	40-98	57-80	41-23	57-62	41-48	71
72	58-98	41-30	58-80	41-55	58-62	41-81	58-43	42-07	72
73	59-80	41-87	59-61	42-13	59-43	42-39	59-24	42-65	73
74	60-62	42-44	60-43	42-71	60-24	42-97	60-06	43-23	74
75	61-44	43-02	61-25	43-29	61-06	43-55	60-87	43-82	75
76	62-26	43-59	62-06	43-86	61-87	44-13	61-68	44-40	76
77	63-07	44-17	62-88	44-44	62-69	44-71	62-49	44-99	77
78	63-89	44-74	63-70	45-02	63-59	45-29	63-30	45-57	78
79	64-71	45-31	64-51	45-59	64-32	45-88	64-11	46-16	79
80	65-53	45-89	65-33	46-17	65-13	46-46	64-93	46-74	80
81	66-35	46-46	66-15	46-75	65-94	47-04	65-74	47-32	81
82	67-17	47-03	66-96	47-33	66-76	47-62	66-55	47-91	82
83	67-99	47-61	67-78	47-90	67-57	48-20	67-36	48-49	83
84	68-81	48-18	68-60	48-48	68-39	48-78	68-17	49-08	84
85	69-63	48-75	69-41	49-06	69-29	49-36	68-98	49-66	85
86	70-45	49-33	70-23	49-63	70-01	49-94	69-80	50-25	86
87	71-27	49-90	71-05	50-21	70-83	50-52	70-61	50-83	87
88	72-09	50-47	71-86	50-79	71-64	51-10	71-42	51-41	88
89	72-90	51-05	72-68	51-37	72-46	51-68	72-23	52-00	89
90	73-72	51-62	73-50	51-94	73-27	52-26	73-04	52-58	90
91	74-54	52-20	74-31	52-52	74-08	52-84	73-85	53-17	91
92	75-36	52-77	75-13	53-10	74-90	53-42	74-66	53-75	92
93	76-18	53-34	75-95	53-67	75-71	54-01	75-48	54-34	93
94	77-00	53-92	76-76	54-25	76-53	54-59	76-29	54-92	94
95	77-82	54-49	77-58	54-83	77-34	55-17	77-10	55-50	95
96	78-64	55-06	78-40	55-41	78-16	55-75	77-91	56-09	96
97	79-46	55-64	79-21	55-98	78-97	56-33	78-72	56-67	97
98	80-28	56-21	80-03	56-56	79-78	56-91	79-53	57-26	98
99	81-10	56-78	80-85	57-14	80-60	57-49	80-35	57-84	99
100	81-92	57-36	81-66	57-71	81-41	58-07	81-16	58-42	100
Distance.	55 DEG.		54 $\frac{1}{4}$ DEG.		54 $\frac{1}{2}$ DEG.		54 $\frac{3}{4}$ DEG.		Distance.
	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	

Distance.	36 DEG.		36 $\frac{1}{4}$ DEG.		36 $\frac{1}{2}$ DEG.		36 $\frac{3}{4}$ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	0.81	0.59	0.81	0.59	0.80	0.59	0.80	0.60	1
2	1.62	1.18	1.61	1.18	1.61	1.19	1.60	1.20	2
3	2.43	1.76	2.42	1.77	2.41	1.78	2.40	1.79	3
4	3.24	2.35	3.23	2.37	3.22	2.38	3.20	2.39	4
5	4.05	2.94	4.03	2.96	4.02	2.97	4.01	2.99	5
6	4.85	3.53	4.84	3.55	4.82	3.57	4.81	3.59	6
7	5.66	4.11	5.65	4.14	5.63	4.16	5.61	4.19	7
8	6.47	4.70	6.45	4.73	6.43	4.76	6.41	4.79	8
9	7.28	5.29	7.26	5.32	7.23	5.35	7.21	5.38	9
10	8.09	5.88	8.06	5.91	8.04	5.95	8.01	5.98	10
11	8.90	6.47	8.87	6.50	8.84	6.54	8.81	6.58	11
12	9.71	7.05	9.68	7.10	9.65	7.14	9.61	7.18	12
13	10.52	7.64	10.48	7.69	10.45	7.73	10.42	7.78	13
14	11.33	8.23	11.29	8.28	11.25	8.33	11.22	8.38	14
15	12.14	8.82	12.10	8.87	12.06	8.92	12.02	8.97	15
16	12.94	9.40	12.90	9.46	12.86	9.52	12.82	9.57	16
17	13.75	9.99	13.71	10.05	13.67	10.11	13.62	10.17	17
18	14.56	10.58	14.52	10.64	14.47	10.71	14.42	10.77	18
19	15.37	11.17	15.32	11.23	15.27	11.30	15.22	11.37	19
20	16.18	11.76	16.13	11.83	16.08	11.90	16.03	11.97	20
21	16.99	12.34	16.94	12.42	16.88	12.49	16.83	12.56	21
22	17.80	12.93	17.74	13.01	17.68	13.09	17.63	13.16	22
23	18.61	13.52	18.55	13.60	18.49	13.68	18.43	13.76	23
24	19.42	14.11	19.35	14.19	19.29	14.28	19.23	14.36	24
25	20.23	14.69	20.16	14.78	20.10	14.87	20.03	14.96	25
26	21.03	15.28	20.97	15.37	20.90	15.47	20.83	15.56	26
27	21.84	15.87	21.77	15.97	21.70	16.06	21.63	16.15	27
28	22.65	16.46	22.58	16.56	22.51	16.65	22.44	16.75	28
29	23.46	17.05	23.39	17.15	23.31	17.25	23.24	17.35	29
30	24.27	17.63	24.19	17.74	24.12	17.84	24.04	17.95	30
31	25.08	18.22	25.00	18.33	24.92	18.44	24.84	18.55	31
32	25.89	18.81	25.81	18.92	25.72	19.03	25.64	19.15	32
33	26.70	19.40	26.61	19.51	26.53	19.63	26.44	19.74	33
34	27.51	19.98	27.42	20.10	27.33	20.22	27.24	20.34	34
35	28.32	20.57	28.23	20.70	28.13	20.82	28.04	20.94	35
36	29.12	21.16	29.03	21.29	28.94	21.41	28.85	21.54	36
37	29.93	21.75	29.84	21.88	29.74	22.01	29.65	22.14	37
38	30.74	22.34	30.64	22.47	30.55	22.60	30.45	22.74	38
39	31.55	22.92	31.45	23.06	31.35	23.20	31.25	23.33	39
40	32.36	23.51	32.26	23.65	32.15	23.79	32.05	23.93	40
41	33.17	24.10	33.06	24.24	32.96	24.39	32.85	24.53	41
42	33.98	24.69	33.87	24.83	33.76	24.98	33.65	25.13	42
43	34.79	25.27	34.68	25.43	34.57	25.58	34.45	25.73	43
44	35.60	25.86	35.48	26.02	35.37	26.17	35.26	26.33	44
45	36.41	26.45	36.29	26.61	36.17	26.77	36.06	26.92	45
46	37.21	27.04	37.10	27.20	36.98	27.36	36.86	27.52	46
47	38.02	27.63	37.90	27.79	37.78	27.96	37.66	28.12	47
48	38.83	28.21	38.71	28.38	38.59	28.55	38.46	28.72	48
49	39.64	28.80	39.52	28.97	39.39	29.15	39.26	29.32	49
50	40.45	29.39	40.32	29.57	40.19	29.74	40.06	29.92	50
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	54 DEG.		53 $\frac{3}{4}$ DEG.		53 $\frac{1}{2}$ DEG.		53 $\frac{1}{4}$ DEG.		

Distance.	36 DEG.		36 $\frac{1}{2}$ DEG.		36 $\frac{1}{2}$ DEG.		36 $\frac{1}{2}$ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	41-26	29-98	41-13	30-16	41-00	30-34	40-86	30-51	51
52	42-07	30-56	41-94	30-75	41-80	30-93	41-67	31-11	52
53	42-88	31-15	42-74	31-34	42-60	31-53	42-47	31-71	53
54	43-69	31-74	43-55	31-93	43-41	32-12	43-27	32-31	54
55	44-50	32-33	44-35	32-52	44-21	32-72	44-07	32-91	55
56	45-30	32-92	45-16	33-11	45-02	33-31	44-87	33-51	56
57	46-11	33-50	45-97	33-70	45-82	33-90	45-67	34-10	57
58	46-92	34-09	46-77	34-30	46-62	34-50	46-47	34-70	58
59	47-73	34-68	47-58	34-89	47-43	35-09	47-27	35-30	59
60	48-54	35-27	48-39	35-48	48-23	35-69	48-08	35-90	60
61	49-35	35-85	49-19	36-07	49-04	36-28	48-88	36-50	61
62	50-16	36-44	50-00	36-66	49-84	36-88	49-68	37-10	62
63	50-97	37-03	50-81	37-25	50-64	37-47	50-48	37-69	63
64	51-78	37-62	51-61	37-84	51-45	38-07	51-28	38-29	64
65	52-59	38-21	52-42	38-44	52-25	38-66	52-08	38-89	65
66	53-40	38-79	53-23	39-03	53-05	39-26	52-88	39-49	66
67	54-20	39-38	54-03	39-62	53-86	39-85	53-68	40-09	67
68	55-01	39-97	54-84	40-21	54-66	40-45	54-49	40-69	68
69	55-82	40-56	55-64	40-80	55-47	41-04	55-29	41-28	69
70	56-63	41-14	56-45	41-39	56-27	41-64	56-09	41-88	70
71	57-44	41-73	57-26	41-98	57-07	42-23	56-89	42-48	71
72	58-25	42-32	58-06	42-57	57-88	42-83	57-69	43-08	72
73	59-06	42-91	58-87	43-17	58-68	43-42	58-49	43-68	73
74	59-87	43-50	59-68	43-76	59-49	44-02	59-29	44-28	74
75	60-68	44-08	60-48	44-35	60-29	44-61	60-09	44-87	75
76	61-49	44-67	61-29	44-94	61-09	45-21	60-90	45-47	76
77	62-29	45-26	62-10	45-53	61-90	45-80	61-70	46-07	77
78	63-10	45-85	62-90	46-12	62-70	46-40	62-50	46-67	78
79	63-91	46-43	63-71	46-71	63-50	46-99	63-30	47-27	79
80	64-72	47-02	64-52	47-30	64-31	47-59	64-10	47-87	80
81	65-53	47-61	65-32	47-90	65-11	48-18	64-90	48-46	81
82	66-34	48-20	66-13	48-49	65-92	48-78	65-70	49-06	82
83	67-15	48-79	66-93	49-08	66-72	49-37	66-50	49-66	83
84	67-96	49-37	67-74	49-67	67-52	49-97	67-31	50-26	84
85	68-77	49-96	68-55	50-26	68-33	50-56	68-11	50-86	85
86	69-58	50-55	69-35	50-85	69-13	51-15	68-91	51-46	86
87	70-38	51-14	70-16	51-44	69-94	51-75	69-71	52-05	87
88	71-19	51-73	70-97	52-04	70-74	52-34	70-51	52-65	88
89	72-00	52-31	71-77	52-63	71-54	52-94	71-31	53-25	89
90	72-81	52-90	72-58	53-22	72-35	53-53	72-11	53-85	90
91	73-62	53-49	73-39	53-81	73-15	54-13	72-91	54-45	91
92	74-43	54-08	74-19	54-40	73-95	54-72	73-72	55-05	92
93	75-24	54-66	75-00	54-99	74-76	55-32	74-52	55-64	93
94	76-05	55-25	75-81	55-58	75-56	55-91	75-32	56-24	94
95	76-86	55-84	76-61	56-17	76-37	56-51	76-12	56-84	95
96	77-67	56-43	77-42	56-77	77-17	57-10	76-92	57-44	96
97	78-47	57-02	78-23	57-36	77-97	57-70	77-72	58-04	97
98	79-28	57-60	79-03	57-95	78-78	58-29	78-52	58-64	98
99	80-09	58-19	79-84	58-54	79-58	58-89	79-32	59-23	99
100	80-90	58-78	80-64	59-13	80-39	59-48	80-13	59-83	100
Distance.	54 DEG.		53 $\frac{1}{2}$ DEG.		53 $\frac{1}{2}$ DEG.		53 $\frac{1}{2}$ DEG.		Distance.
	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	

Distance.	37 DEG.		37½ DEG.		37½ DEG.		37¾ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	0-80	0-60	0-80	0-61	0-79	0-61	0-79	0-61	1
2	1-60	1-20	1-59	1-21	1-59	1-22	1-58	1-22	2
3	2-40	1-81	2-39	1-82	2-38	1-83	2-37	1-84	3
4	3-19	2-41	3-18	2-42	3-17	2-43	3-16	2-45	4
5	3-99	3-01	3-98	3-03	3-97	3-04	3-95	3-06	5
6	4-79	3-61	4-78	3-63	4-76	3-65	4-74	3-67	6
7	5-59	4-21	5-57	4-24	5-55	4-26	5-53	4-29	7
8	6-39	4-81	6-37	4-84	6-35	4-87	6-33	4-90	8
9	7-19	5-42	7-16	5-45	7-14	5-48	7-12	5-51	9
10	7-99	6-02	7-96	6-05	7-93	6-09	7-91	6-12	10
11	8-78	6-62	8-76	6-66	8-73	6-70	8-70	6-73	11
12	9-58	7-22	9-55	7-26	9-52	7-31	9-49	7-35	12
13	10-38	7-82	10-35	7-87	10-31	7-91	10-28	7-96	13
14	11-18	8-43	11-14	8-47	11-11	8-52	11-07	8-57	14
15	11-98	9-03	11-94	9-08	11-90	9-13	11-86	9-18	15
16	12-78	9-63	12-74	9-68	12-69	9-74	12-65	9-80	16
17	13-58	10-23	13-53	10-29	13-49	10-35	13-44	10-41	17
18	14-38	10-83	14-33	10-90	14-28	10-96	14-23	11-02	18
19	15-17	11-43	15-12	11-50	15-07	11-57	15-02	11-63	19
20	15-97	12-04	15-92	12-11	15-87	12-18	15-81	12-24	20
21	16-77	12-64	16-72	12-71	16-66	12-78	16-60	12-86	21
22	17-57	13-24	17-51	13-32	17-45	13-39	17-40	13-47	22
23	18-37	13-84	18-31	13-92	18-25	14-00	18-19	14-08	23
24	19-17	14-44	19-10	14-53	19-04	14-61	18-98	14-69	24
25	19-97	15-05	19-90	15-13	19-83	15-22	19-77	15-31	25
26	20-76	15-65	20-70	15-74	20-63	15-83	20-56	15-92	26
27	21-56	16-25	21-49	16-34	21-42	16-44	21-35	16-53	27
28	22-36	16-85	22-29	16-95	22-21	17-05	22-14	17-14	28
29	23-16	17-45	23-08	17-55	23-01	17-65	22-93	17-75	29
30	23-96	18-05	23-88	18-16	23-80	18-26	23-72	18-37	30
31	24-76	18-66	24-68	18-76	24-59	18-87	24-51	18-98	31
32	25-56	19-26	25-47	19-37	25-39	19-48	25-30	19-59	32
33	26-35	19-86	26-27	19-97	26-18	20-09	26-09	20-20	33
34	27-15	20-46	27-06	20-58	26-97	20-70	26-88	20-82	34
35	27-95	21-06	27-86	21-19	27-77	21-31	27-67	21-43	35
36	28-75	21-67	28-66	21-79	28-56	21-92	28-46	22-04	36
37	29-55	22-27	29-45	22-40	29-35	22-52	29-26	22-65	37
38	30-35	22-87	30-25	23-00	30-15	23-13	30-05	23-26	38
39	31-15	23-47	31-04	23-61	30-94	23-74	30-84	23-88	39
40	31-95	24-07	31-84	24-21	31-73	24-35	31-63	24-49	40
41	32-74	24-67	32-64	24-82	32-53	24-96	32-42	25-10	41
42	33-54	25-28	33-43	25-42	33-32	25-57	33-21	25-71	42
43	34-34	25-88	34-23	26-03	34-11	26-18	34-00	26-33	43
44	35-14	26-48	35-02	26-63	34-91	26-79	34-79	26-94	44
45	35-94	27-08	35-82	27-24	35-70	27-39	35-58	27-55	45
46	36-74	27-68	36-62	27-84	36-49	28-00	36-37	28-16	46
47	37-54	28-29	37-41	28-45	37-29	28-61	37-16	28-77	47
48	38-33	28-89	38-21	29-05	38-08	29-22	37-95	29-39	48
49	39-13	29-49	39-00	29-66	38-87	29-83	38-74	30-00	49
50	39-93	30-09	39-80	30-26	39-67	30-44	39-53	30-61	50
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	53 DEG.		52½ DEG.		52½ DEG.		52½ DEG.		

Distance.	37 DEG.		37½ DEG.		37¾ DEG.		37½ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	42° 73'	30-69	41° 60'	30-87	40° 46'	31-05	40° 33'	31-22	51
52	41-53	31-29	41-39	31-48	41-25	31-66	41-12	31-84	52
53	42-23	31-90	42-19	32-08	42-05	32-26	41-91	32-45	53
54	43-13	32-50	42-98	32-69	42-84	32-87	42-70	33-06	54
55	43-32	33-10	43-78	33-29	43-63	33-48	43-49	33-67	55
56	44-72	33-70	44-58	33-90	44-43	34-09	44-28	34-28	56
57	45-52	34-30	45-37	34-50	45-22	34-70	45-07	34-90	57
58	46-32	34-91	46-17	35-11	46-01	35-31	45-86	35-51	58
59	47-12	35-51	46-96	35-71	46-81	35-92	46-65	36-12	59
60	47-92	36-11	47-76	36-32	47-60	36-53	47-44	36-73	60
61	48-72	36-71	48-56	36-92	48-39	37-13	48-23	37-35	61
62	49-52	37-31	49-35	37-53	49-19	37-74	49-02	37-96	62
63	50-31	37-91	50-15	38-13	49-98	38-35	49-81	38-57	63
64	51-11	38-52	50-94	38-74	50-77	38-96	50-60	39-18	64
65	51-91	39-12	51-74	39-34	51-57	39-57	51-39	39-79	65
66	52-71	39-72	52-54	39-95	52-36	40-18	52-19	40-41	66
67	53-51	40-32	53-33	40-55	53-15	40-79	52-98	41-02	67
68	54-31	40-92	54-13	41-16	53-95	41-40	53-77	41-63	68
69	55-11	41-53	54-92	41-77	54-74	42-00	54-56	42-24	69
70	55-90	42-13	55-72	42-37	55-53	42-61	55-35	42-86	70
71	56-70	42-73	56-52	42-98	56-33	43-22	56-14	43-47	71
72	57-50	43-33	57-31	43-58	57-12	43-83	56-93	44-08	72
73	58-30	43-93	58-11	44-19	57-91	44-44	57-72	44-69	73
74	59-10	44-53	58-90	44-79	58-71	45-05	58-51	45-30	74
75	59-90	45-14	59-70	45-40	59-50	45-66	59-30	45-92	75
76	60-70	45-74	60-50	46-00	60-29	46-27	60-09	46-53	76
77	61-49	46-34	61-29	46-61	61-09	46-87	60-88	47-14	77
78	62-29	46-94	62-09	47-21	61-88	47-48	61-67	47-75	78
79	63-09	47-54	62-88	47-82	62-67	48-09	62-46	48-37	79
80	63-89	48-15	63-68	48-42	63-47	48-70	63-26	48-98	80
81	64-69	48-75	64-48	49-03	64-26	49-31	64-05	49-59	81
82	65-49	49-35	65-27	49-63	65-05	49-92	64-84	50-20	82
83	66-29	49-95	66-07	50-24	65-85	50-53	65-63	50-81	83
84	67-09	50-55	66-86	50-84	66-64	51-14	66-42	51-43	84
85	67-88	51-15	67-66	51-45	67-43	51-74	67-21	52-04	85
86	68-68	51-76	68-46	52-06	68-23	52-35	68-00	52-65	86
87	69-48	52-36	69-25	52-66	69-02	52-96	68-79	53-26	87
88	70-28	52-96	70-05	53-27	69-82	53-57	69-58	53-88	88
89	71-08	53-56	70-84	53-87	70-61	54-18	70-37	54-49	89
90	71-88	54-16	71-64	54-48	71-40	54-79	71-16	55-10	90
91	72-68	54-77	72-44	55-08	72-20	55-40	71-95	55-71	91
92	73-47	55-37	73-23	55-69	72-99	56-01	72-74	56-32	92
93	74-27	55-97	74-03	56-29	73-78	56-61	73-53	56-94	93
94	75-07	56-57	74-82	56-90	74-58	57-22	74-32	57-55	94
95	75-87	57-17	75-62	57-50	75-37	57-83	75-12	58-16	95
96	76-67	57-77	76-42	58-11	76-16	58-44	75-91	58-77	96
97	77-47	58-38	77-21	58-71	76-96	59-05	76-70	59-39	97
98	78-27	58-98	78-01	59-32	77-75	59-66	77-49	60-00	98
99	79-06	59-58	78-80	59-92	78-54	60-27	78-28	60-61	99
100	79-86	60-18	79-60	60-53	79-34	60-88	79-07	61-22	100
Distance.	53 DEG.		52½ DEG.		52¼ DEG.		52½ DEG.		Distance.
	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	

Distance.	38 DEG.		38½ DEG.		38¾ DEG.		38¾ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	0.79	0.62	0.79	0.62	0.78	0.62	0.78	0.63	1
2	1.58	1.23	1.57	1.24	1.57	1.24	1.56	1.25	2
3	2.36	1.85	2.36	1.86	2.35	1.87	2.34	1.88	3
4	3.15	2.46	3.14	2.48	3.13	2.49	3.12	2.50	4
5	3.94	3.08	3.93	3.10	3.91	3.11	3.90	3.13	5
6	4.73	3.69	4.71	3.71	4.70	3.74	4.68	3.76	6
7	5.52	4.31	5.50	4.33	5.48	4.36	5.46	4.38	7
8	6.30	4.93	6.28	4.95	6.26	4.98	6.24	5.01	8
9	7.09	5.54	7.07	5.57	7.04	5.60	7.02	5.63	9
10	7.88	6.16	7.85	6.19	7.83	6.23	7.80	6.26	10
11	8.67	6.77	8.64	6.81	8.61	6.85	8.58	6.89	11
12	9.46	7.39	9.42	7.43	9.39	7.47	9.36	7.51	12
13	10.24	8.00	10.21	8.05	10.17	8.09	10.14	8.14	13
14	11.03	8.62	10.99	8.67	10.96	8.72	10.92	8.76	14
15	11.82	9.23	11.78	9.29	11.74	9.34	11.70	9.39	15
16	12.61	9.85	12.57	9.91	12.52	9.96	12.48	10.01	16
17	13.40	10.47	13.35	10.52	13.30	10.58	13.26	10.64	17
18	14.18	11.08	14.14	11.14	14.09	11.21	14.04	11.27	18
19	14.97	11.70	14.92	11.76	14.87	11.83	14.82	11.89	19
20	15.76	12.31	15.71	12.38	15.65	12.45	15.60	12.52	20
21	16.55	12.93	16.49	13.00	16.43	13.07	16.38	13.14	21
22	17.34	13.54	17.28	13.62	17.22	13.70	17.16	13.77	22
23	18.12	14.16	18.06	14.24	18.00	14.32	17.94	14.40	23
24	18.91	14.78	18.85	14.86	18.78	14.94	18.72	15.02	24
25	19.70	15.39	19.63	15.48	19.57	15.56	19.50	15.65	25
26	20.49	16.01	20.42	16.10	20.35	16.19	20.28	16.27	26
27	21.28	16.62	21.20	16.72	21.13	16.81	21.06	16.90	27
28	22.06	17.24	21.99	17.33	21.91	17.43	21.84	17.53	28
29	22.85	17.85	22.77	17.95	22.70	18.05	22.62	18.15	29
30	23.64	18.47	23.56	18.57	23.48	18.68	23.40	18.78	30
31	24.43	19.09	24.34	19.19	24.26	19.30	24.18	19.40	31
32	25.22	19.70	25.13	19.81	25.04	19.92	24.96	20.03	32
33	26.00	20.32	25.92	20.43	25.83	20.54	25.74	20.66	33
34	26.79	20.93	26.70	21.05	26.61	21.17	26.52	21.28	34
35	27.58	21.55	27.49	21.67	27.39	21.79	27.30	21.91	35
36	28.37	22.16	28.27	22.29	28.17	22.41	28.08	22.53	36
37	29.16	22.78	29.06	22.91	28.96	23.03	28.86	23.16	37
38	29.94	23.40	29.84	23.53	29.74	23.66	29.64	23.79	38
39	30.73	24.01	30.63	24.14	30.52	24.28	30.42	24.41	39
40	31.52	24.63	31.41	24.76	31.30	24.90	31.20	25.04	40
41	32.31	25.24	32.20	25.38	32.09	25.52	31.98	25.66	41
42	33.10	25.86	32.98	26.00	32.87	26.15	32.76	26.29	42
43	33.88	26.47	33.77	26.62	33.65	26.77	33.53	26.91	43
44	34.67	27.09	34.55	27.24	34.43	27.39	34.31	27.54	44
45	35.46	27.70	35.34	27.86	35.22	28.01	35.09	28.17	45
46	36.25	28.32	36.12	28.48	36.00	28.64	35.87	28.79	46
47	37.04	28.94	36.91	29.10	36.78	29.26	36.65	29.42	47
48	37.82	29.55	37.70	29.72	37.57	29.88	37.43	30.04	48
49	38.61	30.17	38.48	30.34	38.35	30.50	38.21	30.67	49
50	39.40	30.78	39.27	30.95	39.13	31.13	38.99	31.30	50
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	52 DEG.		51½ DEG.		51½ DEG.		51¼ DEG.		

Distance.	38 DEG.		38 $\frac{1}{4}$ DEG.		38 $\frac{1}{2}$ DEG.		38 $\frac{3}{4}$ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	40-19	31-40	40-05	31-57	39-91	31-75	39-77	31-92	51
52	40-98	32-01	40-84	32-19	40-70	32-37	40-55	32-55	52
53	41-76	32-63	41-62	32-81	41-48	32-99	41-33	33-17	53
54	42-55	33-25	42-41	33-43	42-26	33-62	42-11	33-80	54
55	43-34	33-86	43-19	34-05	43-04	34-24	42-89	34-43	55
56	44-13	34-48	43-98	34-67	43-83	34-86	43-67	35-05	56
57	44-92	35-09	44-76	35-29	44-61	35-48	44-45	35-68	57
58	45-70	35-71	45-55	35-91	45-39	36-11	45-23	36-30	58
59	46-49	36-32	46-33	36-53	46-17	36-73	46-01	36-93	59
60	47-28	36-94	47-12	37-15	46-96	37-35	46-79	37-56	60
61	48-07	37-56	47-90	37-76	47-74	37-97	47-57	38-18	61
62	48-86	38-17	48-69	38-38	48-52	38-60	48-35	38-81	62
63	49-64	38-79	49-47	39-00	49-30	39-22	49-13	39-43	63
64	50-43	39-40	50-26	39-62	50-09	39-84	49-91	40-06	64
65	51-22	40-02	51-05	40-24	50-87	40-46	50-69	40-68	65
66	52-01	40-63	51-83	40-86	51-65	41-09	51-47	41-31	66
67	52-80	41-25	52-62	41-48	52-43	41-71	52-25	41-94	67
68	53-58	41-86	53-40	42-10	53-22	42-33	53-03	42-56	68
69	54-37	42-48	54-19	42-72	54-00	42-95	53-81	43-19	69
70	55-16	43-10	54-97	43-34	54-78	43-58	54-59	43-81	70
71	55-95	43-71	55-76	43-96	55-57	44-20	55-37	44-44	71
72	56-74	44-33	56-54	44-57	56-35	44-82	56-15	45-07	72
73	57-52	44-94	57-33	45-19	57-13	45-44	56-93	45-69	73
74	58-31	45-56	58-11	45-81	57-91	46-07	57-71	46-32	74
75	59-10	46-17	58-90	46-43	58-70	46-69	58-49	46-94	75
76	59-89	46-79	59-68	47-05	59-48	47-31	59-27	47-57	76
77	60-68	47-41	60-47	47-67	60-26	47-93	60-05	48-20	77
78	61-46	48-02	61-25	48-29	61-04	48-56	60-83	48-82	78
79	62-25	48-64	62-04	48-91	61-83	49-18	61-61	49-45	79
80	63-04	49-25	62-83	49-53	62-61	49-80	62-39	50-07	80
81	63-83	49-87	63-61	50-15	63-39	50-42	63-17	50-70	81
82	64-62	50-48	64-40	50-77	64-17	51-05	63-95	51-33	82
83	65-40	51-10	65-18	51-38	64-96	51-67	64-73	51-95	83
84	66-19	51-72	65-97	52-00	65-74	52-29	65-51	52-58	84
85	66-98	52-33	66-75	52-62	66-52	52-91	66-29	53-20	85
86	67-77	52-95	67-54	53-24	67-30	53-54	67-07	53-83	86
87	68-56	53-56	68-32	53-86	68-09	54-16	67-85	54-46	87
88	69-34	54-18	69-11	54-48	68-87	54-78	68-63	55-08	88
89	70-13	54-79	69-89	55-10	69-65	55-40	69-41	55-71	89
90	70-92	55-41	70-68	55-72	70-43	56-03	70-19	56-33	90
91	71-71	56-03	71-46	56-34	71-22	56-65	70-97	56-96	91
92	72-50	56-64	72-25	56-96	72-00	57-27	71-75	57-58	92
93	73-28	57-26	73-03	57-58	72-78	57-89	72-53	58-21	93
94	74-07	57-87	73-82	58-19	73-57	58-52	73-31	58-84	94
95	74-86	58-49	74-61	58-81	74-35	59-14	74-09	59-46	95
96	75-65	59-10	75-39	59-43	75-13	59-76	74-87	60-09	96
97	76-44	59-72	76-18	60-05	75-91	60-38	75-65	60-71	97
98	77-22	60-33	76-96	60-67	76-70	61-01	76-43	61-34	98
99	78-01	60-95	77-75	61-29	77-48	61-63	77-21	61-97	99
100	78-80	61-57	78-53	61-91	78-26	62-25	77-99	62-59	100
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	52 DEG.		51 $\frac{1}{4}$ DEG.		51 $\frac{1}{2}$ DEG.		51 $\frac{3}{4}$ DEG.		

Distance.	39 DEG.		39 $\frac{1}{2}$ DEG.		39 $\frac{1}{2}$ DEG.		39 $\frac{3}{4}$ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	0-78	0-63	0-77	0-63	0-77	0-64	0-77	0-64	1
2	1-55	1-26	1-55	1-27	1-54	1-27	1-54	1-28	2
3	2-33	1-89	2-32	1-90	2-31	1-91	2-31	1-92	3
4	3-11	2-52	3-10	2-53	3-09	2-54	3-08	2-56	4
5	3-89	3-15	3-87	3-16	3-86	3-18	3-84	3-20	5
6	4-66	3-78	4-65	3-80	4-63	3-82	4-61	3-84	6
7	5-44	4-41	5-42	4-43	5-40	4-45	5-38	4-48	7
8	6-22	5-03	6-20	5-06	6-17	5-09	6-15	5-12	8
9	6-99	5-66	6-97	5-69	6-94	5-72	6-92	5-75	9
10	7-77	6-29	7-74	6-33	7-72	6-36	7-69	6-39	10
11	8-55	6-92	8-52	6-96	8-49	7-00	8-46	7-03	11
12	9-33	7-55	9-29	7-59	9-26	7-63	9-23	7-67	12
13	10-10	8-18	10-07	8-23	10-03	8-27	9-99	8-31	13
14	10-88	8-81	10-84	8-86	10-80	8-91	10-76	8-95	14
15	11-66	9-44	11-62	9-49	11-57	9-54	11-53	9-59	15
16	12-43	10-07	12-39	10-12	12-35	10-18	12-30	10-23	16
17	13-21	10-70	13-16	10-76	13-12	10-81	13-07	10-87	17
18	13-99	11-33	13-94	11-39	13-89	11-45	13-84	11-51	18
19	14-77	11-96	14-71	12-02	14-66	12-09	14-61	12-15	19
20	15-54	12-59	15-49	12-65	15-43	12-72	15-38	12-79	20
21	16-32	13-22	16-26	13-29	16-20	13-36	16-15	13-43	21
22	17-10	13-84	17-04	13-92	16-98	13-99	16-91	14-07	22
23	17-87	14-47	17-81	14-55	17-75	14-63	17-68	14-71	23
24	18-65	15-10	18-59	15-18	18-52	15-27	18-45	15-35	24
25	19-43	15-73	19-36	15-82	19-29	15-90	19-22	15-99	25
26	20-21	16-36	20-13	16-45	20-06	16-54	19-99	16-63	26
27	20-98	16-99	20-91	17-08	20-83	17-17	20-76	17-26	27
28	21-76	17-62	21-68	17-72	21-61	17-81	21-53	17-90	28
29	22-54	18-25	22-46	18-35	22-38	18-45	22-30	18-54	29
30	23-31	18-88	23-23	18-98	23-15	19-08	23-07	19-18	30
31	24-09	19-51	24-01	19-61	23-92	19-72	23-83	19-82	31
32	24-87	20-14	24-78	20-25	24-69	20-35	24-60	20-46	32
33	25-65	20-77	25-55	20-88	25-46	20-99	25-37	21-10	33
34	26-42	21-40	26-33	21-51	26-24	21-63	26-14	21-74	34
35	27-20	22-03	27-10	22-14	27-01	22-26	26-91	22-38	35
36	27-98	22-66	27-88	22-78	27-78	22-90	27-68	23-02	36
37	28-75	23-28	28-65	23-41	28-55	23-53	28-45	23-66	37
38	29-53	23-91	29-43	24-04	29-32	24-17	29-22	24-30	38
39	30-31	24-54	30-20	24-68	30-09	24-81	29-98	24-94	39
40	31-09	25-17	30-98	25-31	30-86	25-44	30-75	25-58	40
41	31-86	25-80	31-75	25-94	31-64	26-08	31-52	26-22	41
42	32-64	26-43	32-52	26-57	32-41	26-72	32-29	26-86	42
43	33-42	27-06	33-30	27-21	33-18	27-35	33-06	27-50	43
44	34-19	27-69	34-07	27-84	33-95	27-99	33-83	28-14	44
45	34-97	28-32	34-85	28-47	34-72	28-62	34-60	28-77	45
46	35-75	28-95	35-62	29-10	35-49	29-26	35-37	29-41	46
47	36-53	29-58	36-40	29-74	36-27	29-90	36-14	30-05	47
48	37-30	30-21	37-17	30-37	37-04	30-53	36-90	30-69	48
49	38-08	30-84	37-95	31-00	37-81	31-17	37-67	31-33	49
50	38-86	31-47	38-72	31-64	38-58	31-80	38-44	31-97	50
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	51 DEG.		50 $\frac{3}{4}$ DEG.		50 $\frac{1}{2}$ DEG.		50 $\frac{1}{4}$ DEG.		

Distance.	39 DEG.		39½ DEG.		39½ DEG.		39½ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	39-63	32-10	39-49	32-27	39-35	32-44	39-21	32-61	51
52	40-41	32-72	40-27	32-90	40-12	33-08	39-98	33-25	52
53	41-19	33-35	41-04	33-53	40-90	33-71	40-75	33-89	53
54	41-97	33-98	41-82	34-17	41-67	34-35	41-52	34-53	54
55	42-74	34-61	42-59	34-80	42-44	34-98	42-29	35-17	55
56	43-52	35-24	43-37	35-43	43-21	35-62	43-06	35-81	56
57	44-30	35-87	44-14	36-06	43-98	36-26	43-82	36-45	57
58	45-07	36-50	44-91	36-70	44-75	36-89	44-59	37-09	58
59	45-85	37-13	45-69	37-33	45-53	37-53	45-36	37-73	59
60	46-63	37-76	46-46	37-96	46-30	38-16	46-13	38-37	60
61	47-41	38-39	47-24	38-60	47-07	38-80	46-90	39-01	61
62	48-18	39-02	48-01	39-23	47-84	39-44	47-67	39-65	62
63	48-96	39-65	48-79	39-86	48-61	40-07	48-44	40-28	63
64	49-74	40-28	49-56	40-49	49-38	40-71	49-21	40-92	64
65	50-51	40-91	50-34	41-13	50-16	41-35	49-97	41-56	65
66	51-29	41-54	51-11	41-76	50-53	41-98	50-74	42-20	66
67	52-07	42-16	51-88	42-39	51-70	42-62	51-51	42-84	67
68	52-85	42-79	52-66	43-62	52-47	43-25	52-28	43-48	68
69	53-52	43-42	53-43	43-66	53-24	43-89	53-05	44-12	69
70	54-40	44-05	54-21	44-29	54-01	44-53	53-82	44-76	70
71	55-18	44-68	54-98	44-92	54-79	45-16	54-59	45-40	71
72	55-95	45-31	55-76	45-55	55-56	45-80	55-36	46-04	72
73	56-73	45-94	56-53	46-19	56-33	46-43	56-13	46-68	73
74	57-51	46-57	57-31	46-82	57-10	47-07	56-89	47-32	74
75	58-29	47-20	58-08	47-45	57-87	47-71	57-66	47-96	75
76	59-06	47-83	58-85	48-09	58-64	48-34	58-43	48-60	76
77	59-84	48-46	59-63	48-72	59-42	48-98	59-20	49-24	77
78	60-62	49-09	60-40	49-35	60-19	49-61	59-97	49-88	78
79	61-39	49-72	61-18	49-98	60-96	50-25	60-74	50-52	79
80	62-17	50-35	61-95	50-62	61-73	50-89	61-51	51-16	80
81	62-95	50-97	62-73	51-25	62-50	51-52	62-28	51-79	81
82	63-73	51-60	63-50	51-88	63-27	52-16	63-04	52-43	82
83	64-50	52-23	64-27	52-51	64-04	52-79	63-81	53-07	83
84	65-28	52-86	65-05	53-15	64-82	53-43	64-58	53-71	84
85	66-06	53-49	65-82	53-78	65-59	54-07	65-35	54-35	85
86	66-83	54-12	66-60	54-41	66-36	54-70	66-12	54-99	86
87	67-61	54-75	67-37	55-05	67-13	55-34	66-89	55-63	87
88	68-39	55-38	68-15	55-68	67-90	55-97	67-66	56-27	88
89	69-17	56-01	68-92	56-32	68-67	56-61	68-43	56-91	89
90	69-94	56-64	69-70	56-94	69-45	57-25	69-20	57-55	90
91	70-72	57-27	70-47	57-58	70-22	57-88	69-96	58-19	91
92	71-50	57-90	71-24	58-21	70-99	58-52	70-73	58-83	92
93	72-27	58-53	72-02	58-84	71-76	59-16	71-50	59-47	93
94	73-05	59-16	72-79	59-47	72-53	59-79	72-27	60-11	94
95	73-83	59-79	73-57	60-11	73-30	60-43	73-04	60-75	95
96	74-61	60-41	74-34	60-74	74-08	61-06	73-81	61-39	96
97	75-38	61-04	75-12	61-37	74-85	61-70	74-58	62-03	97
98	76-16	61-67	75-89	62-01	75-62	62-34	75-35	62-66	98
99	76-94	62-30	76-66	62-64	76-39	62-97	76-12	63-30	99
100	77-71	62-93	77-44	63-27	77-16	63-61	76-88	63-94	100
Distance.	51 DEG.		50½ DEG.		50½ DEG.		50½ DEG.		Distance.
	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	

Distance.	40 DEG.		40 $\frac{1}{4}$ DEG.		40 $\frac{1}{2}$ DEG.		40 $\frac{3}{4}$ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	0-77	0-64	0-76	0-65	0-76	0-65	0-76	0-65	1
2	1-53	1-29	1-53	1-29	1-52	1-30	1-52	1-31	2
3	2-30	1-93	2-29	1-94	2-28	1-95	2-27	1-96	3
4	3-06	2-57	3-05	2-58	3-04	2-60	3-03	2-61	4
5	3-83	3-21	3-82	3-23	3-80	3-25	3-79	3-26	5
6	4-60	3-86	4-58	3-88	4-56	3-90	4-55	3-92	6
7	5-36	4-50	5-34	4-52	5-32	4-55	5-30	4-57	7
8	6-13	5-14	6-11	5-17	6-08	5-20	6-06	5-22	8
9	6-89	5-79	6-87	5-82	6-84	5-84	6-82	5-87	9
10	7-66	6-43	7-63	6-46	7-60	6-49	7-58	6-53	10
11	8-43	7-07	8-40	7-11	8-36	7-14	8-33	7-18	11
12	9-19	7-71	9-16	7-75	9-12	7-79	9-09	7-83	12
13	9-96	8-36	9-92	8-40	9-89	8-44	9-85	8-49	13
14	10-72	9-00	10-69	9-05	10-65	9-09	10-61	9-14	14
15	11-49	9-64	11-45	9-69	11-41	9-74	11-36	9-79	15
16	12-26	10-28	12-21	10-34	12-17	10-39	12-12	10-44	16
17	13-02	10-93	12-97	10-98	12-93	11-04	12-88	11-10	17
18	13-79	11-57	13-74	11-63	13-69	11-69	13-64	11-75	18
19	14-55	12-21	14-50	12-23	14-45	12-34	14-39	12-40	19
20	15-32	12-86	15-26	12-92	15-21	12-99	15-15	13-06	20
21	16-09	13-50	16-03	13-57	15-97	13-64	15-91	13-71	21
22	16-85	14-14	16-79	14-21	16-73	14-29	16-67	14-36	22
23	17-62	14-78	17-55	14-86	17-49	14-94	17-42	15-01	23
24	18-39	15-43	18-32	15-51	18-25	15-59	18-18	15-67	24
25	19-15	16-07	19-08	16-15	19-01	16-24	18-94	16-32	25
26	19-92	16-71	19-84	16-80	19-77	16-89	19-70	16-97	26
27	20-68	17-36	20-61	17-45	20-53	17-54	20-45	17-62	27
28	21-45	18-00	21-37	18-09	21-29	18-18	21-21	18-28	28
29	22-22	18-64	22-13	18-74	22-05	18-83	21-97	18-93	29
30	22-98	19-28	22-90	19-38	22-81	19-48	22-73	19-58	30
31	23-75	19-93	23-66	20-03	23-57	20-13	23-48	20-24	31
32	24-51	20-57	24-42	20-68	24-33	20-78	24-24	20-89	32
33	25-28	21-21	25-19	21-32	25-09	21-43	25-00	21-54	33
34	26-05	21-85	25-95	21-97	25-85	22-08	25-76	22-19	34
35	26-81	22-50	26-71	22-61	26-61	22-73	26-51	22-85	35
36	27-58	23-14	27-48	23-26	27-37	23-38	27-27	23-50	36
37	28-34	23-78	28-24	23-91	28-13	24-03	28-03	24-15	37
38	29-11	24-43	29-00	24-55	28-90	24-68	28-79	24-80	38
39	29-88	25-07	29-77	25-20	29-66	25-33	29-54	25-46	39
40	30-64	25-71	30-53	25-84	30-42	25-98	30-30	26-11	40
41	31-41	26-35	31-29	26-49	31-18	26-63	31-06	26-76	41
42	32-17	27-00	32-06	27-14	31-94	27-28	31-82	27-42	42
43	32-94	27-64	32-82	27-78	32-70	27-93	32-58	28-07	43
44	33-71	28-28	33-58	28-43	33-46	28-58	33-33	28-72	44
45	34-47	28-93	34-35	29-08	34-22	29-23	34-09	29-37	45
46	35-24	29-57	35-11	29-72	34-98	29-87	34-85	30-03	46
47	36-00	30-21	35-87	30-37	35-74	30-52	35-61	30-68	47
48	36-77	30-85	36-64	31-01	36-50	31-17	36-36	31-33	48
49	37-54	31-50	37-40	31-66	37-26	31-82	37-12	31-99	49
50	38-30	32-14	38-16	32-31	38-02	32-47	37-88	32-64	50
Distance.	50 DEG.		49 $\frac{1}{4}$ DEG.		49 $\frac{1}{2}$ DEG.		49 $\frac{3}{4}$ DEG.		Distance.
	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	

Distance.	40 DEG.		40½ DEG.		40½ DEG.		40½ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	39-07	32-78	38-32	32-95	38-78	33-12	38-64	33-29	51
52	39-83	33-42	39-69	33-60	39-54	33-77	39-39	33-94	52
53	40-60	34-07	40-45	34-24	40-30	34-42	40-15	34-60	53
54	41-37	34-71	41-21	34-89	41-06	35-07	40-91	35-25	54
55	42-13	35-35	41-98	35-54	41-82	35-72	41-67	35-90	55
56	42-90	36-00	42-74	36-18	42-58	36-37	42-42	36-55	56
57	43-66	36-64	43-50	36-83	43-34	37-02	43-18	37-21	57
58	44-43	37-28	44-27	37-48	44-10	37-67	43-94	37-86	58
59	45-20	37-92	45-03	38-12	44-86	38-32	44-70	38-51	59
60	45-96	38-57	45-79	38-77	45-62	38-97	45-45	39-17	60
61	46-73	39-21	46-56	39-41	46-38	39-62	46-21	39-82	61
62	47-49	39-85	47-32	40-06	47-15	40-27	46-97	40-47	62
63	48-26	40-50	48-08	40-71	47-91	40-92	47-73	41-12	63
64	49-03	41-14	48-85	41-35	48-67	41-56	48-48	41-78	64
65	49-79	41-78	49-61	42-00	49-43	42-21	49-24	42-43	65
66	50-56	42-42	50-37	42-64	50-19	42-86	50-00	43-08	66
67	51-32	43-07	51-14	43-29	50-95	43-51	50-76	43-73	67
68	52-09	43-71	51-90	43-94	51-71	44-16	51-51	44-39	68
69	52-86	44-35	52-66	44-58	52-47	44-81	52-27	45-04	69
70	53-62	45-09	53-43	45-23	53-23	45-46	53-03	45-69	70
71	54-39	45-64	54-19	45-87	53-99	46-11	53-79	46-35	71
72	55-16	46-28	54-95	46-52	54-75	46-76	54-54	47-00	72
73	55-92	46-92	55-72	47-17	55-51	47-41	55-30	47-65	73
74	56-69	47-57	56-48	47-81	56-27	48-06	56-06	48-30	74
75	57-45	48-21	57-24	48-46	57-03	48-71	56-82	48-96	75
76	58-22	48-85	58-01	49-11	57-79	49-36	57-57	49-61	76
77	58-99	49-49	58-77	49-75	58-55	50-01	58-33	50-26	77
78	59-75	50-14	59-53	50-40	59-31	50-66	59-09	50-92	78
79	60-52	50-78	60-30	51-04	60-07	51-31	59-85	51-57	79
80	61-28	51-42	61-06	51-69	60-83	51-96	60-61	52-22	80
81	62-05	52-07	61-82	52-34	61-59	52-61	61-36	52-87	81
82	62-82	52-71	62-59	52-98	62-35	53-25	62-12	53-53	82
83	63-58	53-35	63-35	53-63	63-11	53-90	62-88	54-18	83
84	64-35	53-99	64-11	54-27	63-87	54-55	63-64	54-83	84
85	65-11	54-64	64-87	54-92	64-63	55-20	64-39	55-48	85
86	65-88	55-28	65-64	55-57	65-39	55-85	65-15	56-14	86
87	66-65	55-92	66-40	56-21	66-16	56-50	65-91	56-79	87
88	67-41	56-57	67-16	56-86	66-92	57-15	66-67	57-44	88
89	68-18	57-21	67-93	57-50	67-68	57-80	67-42	58-10	89
90	68-94	57-85	68-69	58-15	68-44	58-45	68-18	58-75	90
91	69-71	58-49	69-45	58-80	69-20	59-10	68-94	59-40	91
92	70-48	59-14	70-22	59-44	69-96	59-75	69-70	60-05	92
93	71-24	59-78	70-98	60-09	70-72	60-40	70-45	60-71	93
94	72-01	60-42	71-74	60-74	71-48	61-05	71-21	61-36	94
95	72-77	61-06	72-51	61-38	72-24	61-70	71-97	62-01	95
96	73-54	61-71	73-27	62-03	73-00	62-35	72-73	62-66	96
97	74-31	62-35	74-03	62-67	73-76	63-00	73-48	63-32	97
98	75-07	62-99	74-80	63-32	74-52	63-65	74-24	63-97	98
99	75-84	63-64	75-56	63-97	75-28	64-30	75-00	64-62	99
100	76-60	64-28	76-32	64-61	76-04	64-94	75-76	65-28	100
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	50 DEG.		49¾ DEG.		49½ DEG.		49¼ DEG.		

Distance.	41 DEG.		41 $\frac{1}{4}$ DEG.		41 $\frac{1}{2}$ DEG.		41 $\frac{3}{4}$ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	0-75	0-66	0-75	0-66	0-75	0-66	0-75	0-67	1
2	1-51	1-31	1-50	1-32	1-50	1-33	1-49	1-33	2
3	2-26	1-97	2-26	1-98	2-25	1-99	2-24	2-00	3
4	3-02	2-62	3-01	2-64	3-00	2-65	2-98	2-66	4
5	3-77	3-28	3-76	3-30	3-74	3-31	3-73	3-33	5
6	4-53	3-94	4-51	3-96	4-49	3-98	4-48	4-00	6
7	5-28	4-59	5-26	4-62	5-24	4-64	5-22	4-66	7
8	6-04	5-25	6-01	5-27	5-99	5-30	5-97	5-33	8
9	6-79	5-90	6-77	5-93	6-74	5-96	6-71	5-99	9
10	7-55	6-56	7-52	6-59	7-49	6-63	7-46	6-66	10
11	8-30	7-22	8-27	7-25	8-24	7-29	8-21	7-32	11
12	9-06	7-87	9-02	7-91	8-99	7-95	8-95	7-99	12
13	9-81	8-53	9-77	8-57	9-74	8-61	9-70	8-66	13
14	10-57	9-18	10-53	9-23	10-49	9-28	10-44	9-32	14
15	11-32	9-84	11-28	9-89	11-23	9-94	11-19	9-99	15
16	12-08	10-50	12-03	10-55	11-98	10-60	11-94	10-65	16
17	12-83	11-15	12-78	11-21	12-73	11-26	12-68	11-32	17
18	13-58	11-81	13-53	11-87	13-48	11-93	13-43	11-99	18
19	14-34	12-47	14-28	12-53	14-23	12-59	14-18	12-65	19
20	15-09	13-12	15-04	13-19	14-98	13-25	14-92	13-32	20
21	15-85	13-78	15-79	13-85	15-73	13-91	15-67	13-98	21
22	16-60	14-43	16-54	14-51	16-48	14-58	16-41	14-65	22
23	17-36	15-09	17-29	15-16	17-23	15-24	17-16	15-32	23
24	18-11	15-75	18-04	15-82	17-97	15-90	17-91	15-98	24
25	18-87	16-40	18-80	16-48	18-72	16-57	18-65	16-65	25
26	19-62	17-06	19-55	17-14	19-47	17-23	19-40	17-31	26
27	20-38	17-71	20-30	17-80	20-22	17-89	20-14	17-98	27
28	21-13	18-37	21-05	18-46	20-97	18-55	20-89	18-64	28
29	21-89	19-03	21-80	19-12	21-72	19-22	21-64	19-31	29
30	22-64	19-68	22-56	19-78	22-47	19-88	22-38	19-98	30
31	23-40	20-34	23-31	20-44	23-22	20-54	23-13	20-64	31
32	24-15	20-99	24-06	21-10	23-97	21-20	23-87	21-31	32
33	24-91	21-65	24-81	21-76	24-72	21-87	24-62	21-97	33
34	25-66	22-31	25-56	22-42	25-46	22-53	25-37	22-64	34
35	26-41	22-96	26-31	23-08	26-21	23-19	26-11	23-31	35
36	27-17	23-62	27-07	23-74	26-96	23-85	26-86	23-97	36
37	27-92	24-27	27-82	24-40	27-71	24-52	27-60	24-64	37
38	28-68	24-93	28-57	25-06	28-46	25-18	28-35	25-30	38
39	29-43	25-59	29-32	25-71	29-21	25-84	29-10	25-97	39
40	30-19	26-24	30-07	26-37	29-96	26-50	29-84	26-64	40
41	30-94	26-90	30-83	27-03	30-71	27-17	30-59	27-30	41
42	31-70	27-55	31-58	27-69	31-46	27-83	31-33	27-97	42
43	32-45	28-21	32-33	28-35	32-21	28-49	32-08	28-63	43
44	33-21	28-87	33-08	29-01	32-95	29-16	32-83	29-30	44
45	33-96	29-52	33-83	29-67	33-70	29-82	33-57	29-97	45
46	34-72	30-18	34-58	30-33	34-45	30-48	34-32	30-63	46
47	35-47	30-83	35-34	30-99	35-20	31-14	35-06	31-30	47
48	36-23	31-49	36-09	31-65	35-95	31-81	35-81	31-96	48
49	36-98	32-15	36-84	32-31	36-70	32-47	36-56	32-63	49
50	37-74	32-80	37-59	32-97	37-45	33-13	37-30	33-29	50
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	49 DEG.		48 $\frac{3}{4}$ DEG.		48 $\frac{1}{2}$ DEG.		48 $\frac{1}{4}$ DEG.		

Distance.	41 DEG.		41 $\frac{1}{2}$ DEG.		41 $\frac{1}{2}$ DEG.		41 $\frac{1}{2}$ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	38-49	33-46	38-34	33-3	38-20	33-79	38-05	33-06	51
52	39-24	34-12	39-10	34-29	38-95	34-46	38-79	34-63	52
53	40-00	34-77	39-85	34-95	39-69	35-12	39-54	35-29	53
54	40-75	35-43	40-60	35-60	40-44	35-78	40-29	35-96	54
55	41-51	36-08	41-35	35-26	41-19	36-44	41-03	36-62	55
56	42-26	36-74	42-10	36-92	41-94	37-11	41-78	37-29	56
57	43-02	37-40	42-85	37-58	42-69	37-77	42-53	37-96	57
58	43-77	38-05	43-61	38-24	43-44	38-43	42-27	38-62	58
59	44-53	38-71	44-36	38-90	44-19	39-09	44-02	39-29	59
60	45-28	39-36	45-11	39-56	44-94	39-76	44-76	39-95	60
61	46-04	40-02	45-86	40-22	45-69	40-42	45-51	40-62	61
62	46-79	40-68	46-61	40-88	46-44	41-08	46-26	41-28	62
63	47-55	41-33	47-37	41-54	47-18	41-75	47-00	41-95	63
64	48-30	41-99	48-12	42-20	47-93	42-41	47-75	42-62	64
65	49-06	42-64	48-87	42-86	48-68	43-07	48-49	43-28	65
66	49-81	43-30	49-62	43-52	49-43	43-73	49-24	43-95	66
67	50-57	43-96	50-37	44-18	50-18	44-40	49-99	44-61	67
68	51-32	44-61	51-13	44-84	50-93	45-06	50-73	45-23	68
69	52-07	45-27	51-88	45-49	51-68	45-72	51-48	45-95	69
70	52-83	45-92	52-63	46-15	52-43	46-38	52-22	46-61	70
71	53-58	46-58	53-38	46-81	53-18	47-05	52-97	47-28	71
72	54-34	47-24	54-13	47-47	53-92	47-71	53-72	47-94	72
73	55-09	47-89	54-88	48-13	54-67	48-37	54-46	48-61	73
74	55-85	48-55	55-64	48-79	55-42	49-03	55-21	49-28	74
75	56-69	49-20	56-39	49-45	56-17	49-70	55-95	49-94	75
76	57-36	49-86	57-14	50-11	56-92	50-36	56-70	50-61	76
77	58-11	50-52	57-89	50-77	57-67	51-02	57-45	51-27	77
78	58-87	51-17	58-64	51-43	58-42	51-68	58-19	51-94	78
79	59-62	51-83	59-40	52-09	59-17	52-35	58-94	52-60	79
80	60-38	52-48	60-15	52-75	59-92	53-01	59-68	53-27	80
81	61-13	53-14	60-90	53-41	60-67	53-67	60-43	53-94	81
82	61-89	53-80	61-65	54-07	61-41	54-33	61-18	54-60	82
83	62-64	54-45	62-40	54-73	62-16	55-00	61-92	55-27	83
84	63-40	55-11	63-15	55-38	62-91	55-66	62-67	55-93	84
85	64-15	55-76	63-91	56-04	63-66	56-32	63-41	56-60	85
86	64-90	56-42	64-66	56-70	64-41	56-99	64-16	57-27	86
87	65-66	57-08	65-41	57-36	65-16	57-65	64-91	57-93	87
88	66-41	57-73	66-16	58-02	65-91	58-31	65-65	58-60	88
89	67-17	58-39	66-91	58-68	66-66	58-97	66-40	59-26	89
90	67-92	59-05	67-67	59-34	67-41	59-64	67-15	59-93	90
91	68-68	59-70	68-42	60-00	68-15	60-30	67-89	60-60	91
92	69-43	60-36	69-17	60-66	68-90	60-96	68-64	61-26	92
93	70-19	61-01	69-92	61-32	69-65	61-62	69-38	61-93	93
94	70-94	61-67	70-67	61-98	70-40	62-29	70-13	62-59	94
95	71-70	62-33	71-43	62-64	71-15	62-95	70-88	63-26	95
96	72-45	62-98	72-18	63-30	71-90	63-61	71-62	63-92	96
97	73-21	63-64	72-93	63-96	72-65	64-27	72-37	64-59	97
98	73-96	64-29	73-68	64-62	73-40	64-94	73-11	65-26	98
99	74-72	64-95	74-43	65-28	74-15	65-60	73-86	65-92	99
100	75-47	65-61	75-18	65-93	74-90	66-26	74-61	66-59	100
Distance.	49 DEG.		48 $\frac{1}{2}$ DEG.		48 $\frac{1}{2}$ DEG.		48 $\frac{1}{2}$ DEG.		Distance.
	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	

Distance.	42 DEG.		42 $\frac{1}{4}$ DEG.		42 $\frac{1}{2}$ DEG.		42 $\frac{3}{4}$ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	0-74	0-67	0-74	0-67	0-74	0-68	0-73	0-68	1
2	1-49	1-34	1-48	1-34	1-47	1-35	1-47	1-36	2
3	2-23	2-01	2-22	2-02	2-21	2-03	2-20	2-04	3
4	2-97	2-68	3-96	2-69	2-95	2-70	2-94	2-72	4
5	3-72	3-35	3-70	3-36	3-69	3-38	3-67	3-39	5
6	4-46	4-01	4-44	4-03	4-42	4-05	4-41	4-07	6
7	5-20	4-68	5-18	4-71	5-16	4-73	5-14	4-75	7
8	5-95	5-35	5-92	5-38	5-90	5-40	5-87	5-43	8
9	6-69	6-02	6-66	6-05	6-64	6-08	6-61	6-11	9
10	7-43	6-69	7-40	6-72	7-37	6-76	7-34	6-79	10
11	8-17	7-36	8-14	7-40	8-11	7-43	8-08	7-47	11
12	8-92	8-03	8-88	8-07	8-85	8-11	8-81	8-15	12
13	9-66	8-70	9-62	8-74	9-58	8-78	9-55	8-82	13
14	10-40	9-37	10-36	9-41	10-32	9-46	10-28	9-50	14
15	10-15	10-04	11-10	10-09	11-06	10-13	11-01	10-18	15
16	11-89	10-71	11-84	10-76	11-80	10-81	11-75	10-86	16
17	12-63	11-38	12-58	11-43	12-53	11-48	12-48	11-54	17
18	13-38	12-04	13-32	12-10	13-27	12-16	13-22	12-22	18
19	14-12	12-71	14-06	12-77	14-01	12-84	13-95	12-90	19
20	14-86	13-38	14-80	13-45	14-75	13-51	14-69	13-58	20
21	15-61	14-05	15-54	14-12	15-48	14-19	15-42	14-25	21
22	16-35	14-72	16-28	14-79	16-22	14-86	16-16	14-93	22
23	17-09	15-39	17-02	15-46	16-96	15-54	16-89	15-61	23
24	17-84	16-06	17-77	16-14	17-69	16-21	17-62	16-29	24
25	18-58	16-73	18-51	16-81	18-43	16-89	18-36	16-97	25
26	19-32	17-40	19-25	17-48	19-17	17-57	19-09	17-65	26
27	20-06	18-07	19-99	18-15	19-91	18-24	19-83	18-33	27
28	20-81	18-74	20-73	18-83	20-64	18-92	20-56	19-01	28
29	21-55	19-40	21-47	19-50	21-38	19-59	21-30	19-69	29
30	22-29	20-07	22-21	20-17	22-12	20-27	22-03	20-36	30
31	23-04	20-74	22-95	20-84	22-86	20-94	22-76	21-04	31
32	23-78	21-41	23-69	21-52	23-59	21-62	23-50	21-72	32
33	24-52	22-08	24-43	22-19	24-33	22-29	24-23	22-40	33
34	25-27	22-75	25-17	22-86	25-07	22-97	24-97	23-08	34
35	26-01	23-42	25-91	23-53	25-80	23-65	25-70	23-76	35
36	26-75	24-09	26-65	24-21	26-54	24-32	26-44	24-44	36
37	27-50	24-76	27-39	24-88	27-28	25-00	27-17	25-12	37
38	28-24	25-43	28-13	25-55	28-02	25-67	27-90	25-79	38
39	28-98	26-10	28-87	26-22	28-75	26-35	28-64	26-47	39
40	29-73	26-77	29-61	26-89	29-49	27-02	29-37	27-15	40
41	30-47	27-43	30-35	27-57	30-23	27-70	30-11	27-83	41
42	31-21	28-10	31-09	28-24	30-97	28-37	30-84	28-51	42
43	31-96	28-77	31-83	28-91	31-70	29-05	31-58	29-19	43
44	32-70	29-44	32-57	29-58	32-44	29-73	32-31	29-87	44
45	33-44	30-11	33-31	30-26	33-18	30-40	33-04	30-55	45
46	34-18	30-78	34-05	30-93	33-91	31-08	33-78	31-22	46
47	34-93	31-45	34-79	31-60	34-65	31-75	34-51	31-90	47
48	35-67	32-12	35-53	32-27	35-39	32-43	35-25	32-58	48
49	36-41	32-79	36-27	32-95	36-13	33-10	35-98	33-26	49
50	37-16	33-46	37-01	33-62	36-86	33-78	36-72	33-94	50
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	48 DEG.		47 $\frac{3}{4}$ DEG.		47 $\frac{1}{2}$ DEG.		47 $\frac{1}{4}$ DEG.		

Distance.	42 DEG.		42 $\frac{1}{2}$ DEG.		42 $\frac{1}{2}$ DEG.		42 $\frac{1}{2}$ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	37-90	34-13	37-75	34-29	37-60	34-46	37-45	34-62	51
52	38-64	34-79	38-49	34-96	38-34	35-13	38-18	35-30	52
53	39-39	35-46	39-23	35-64	39-08	35-81	38-92	35-98	53
54	40-13	36-13	39-97	36-31	39-81	36-48	39-65	36-66	54
55	40-87	36-80	40-71	36-98	40-55	37-16	40-39	37-33	55
56	41-62	37-47	41-45	37-65	41-29	37-83	41-12	38-01	56
57	42-36	38-14	42-19	38-32	42-02	38-51	41-86	38-69	57
58	43-10	38-81	42-93	39-00	42-76	39-18	42-59	39-37	58
59	43-85	39-48	43-67	39-67	43-50	39-86	43-32	40-05	59
60	44-59	40-15	44-41	40-34	44-24	40-54	44-06	40-73	60
61	45-33	40-82	45-15	41-01	44-97	41-21	44-79	41-41	61
62	46-07	41-49	45-89	41-69	45-71	41-89	45-53	42-09	62
63	46-82	42-16	46-63	42-36	46-45	42-56	46-26	42-76	63
64	47-56	42-82	47-37	43-03	47-19	43-24	47-00	43-44	64
65	48-30	43-49	48-11	43-70	47-92	43-91	47-73	44-12	65
66	49-05	44-16	48-85	44-38	48-66	44-59	48-47	44-80	66
67	49-79	44-83	49-59	45-05	49-40	45-26	49-29	45-48	67
68	50-53	45-50	50-33	45-72	50-13	45-94	49-93	46-16	68
69	51-23	46-17	51-07	46-39	50-87	46-62	50-67	46-84	69
70	52-02	46-84	51-82	47-07	51-61	47-29	51-40	47-52	70
71	52-76	47-51	52-56	47-74	52-35	47-97	52-14	48-19	71
72	53-51	48-18	53-30	48-41	53-08	48-64	52-87	48-87	72
73	54-25	48-85	54-04	49-08	53-82	49-32	53-61	49-55	73
74	54-99	49-52	54-78	49-76	54-56	49-99	54-34	50-23	74
75	55-74	50-18	55-52	50-43	55-30	50-67	55-07	50-91	75
76	56-48	50-85	56-26	51-10	56-03	51-34	55-81	51-59	76
77	57-22	51-52	57-00	51-77	56-77	52-02	56-54	52-27	77
78	57-97	52-19	57-74	52-44	57-51	52-70	57-28	52-95	78
79	58-71	52-86	58-48	53-12	58-24	53-37	58-01	53-63	79
80	59-45	53-53	59-22	53-79	58-98	54-05	58-75	54-30	80
81	60-19	54-20	59-96	54-46	59-72	54-72	59-48	54-98	81
82	60-94	54-87	60-70	55-13	60-46	55-40	60-21	55-66	82
83	61-68	55-54	61-44	55-81	61-19	56-07	60-95	56-34	83
84	62-42	56-21	62-18	56-48	61-93	56-75	61-68	57-02	84
85	63-17	56-88	62-92	57-15	62-67	57-43	62-42	57-70	85
86	63-91	57-55	63-66	57-82	63-41	58-10	63-15	58-38	86
87	64-65	58-21	64-40	58-50	64-14	58-78	63-89	59-06	87
88	65-40	58-88	65-14	59-17	64-88	59-45	64-62	59-73	88
89	66-14	59-55	65-88	59-84	65-62	60-13	65-35	60-41	89
90	66-88	60-22	66-62	60-51	66-35	60-80	66-09	61-09	90
91	67-63	60-89	67-36	61-19	67-09	61-48	66-82	61-77	91
92	68-37	61-56	68-10	61-86	67-83	62-15	67-56	62-45	92
93	69-11	62-23	68-84	62-53	68-57	62-83	68-29	63-13	93
94	69-86	62-90	69-58	63-29	69-30	63-51	69-03	63-81	94
95	70-60	63-57	70-32	63-87	70-04	64-18	69-76	64-49	95
96	71-34	64-24	71-06	64-55	70-78	64-86	70-49	65-16	96
97	72-08	64-91	71-80	65-22	71-52	65-53	71-23	65-84	97
98	72-83	65-57	72-54	65-89	72-25	66-21	71-96	66-52	98
99	73-57	66-24	73-28	66-55	72-99	66-88	72-70	67-20	99
100	74-31	66-91	74-02	67-24	73-73	67-56	73-43	67-88	100
Distance.	48 DEG.		47 $\frac{1}{2}$ DEG.		47 $\frac{1}{2}$ DEG.		47 $\frac{1}{2}$ DEG.		Distance.
	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	

Distance.	43 DEG.		43 $\frac{1}{4}$ DEG.		43 $\frac{1}{2}$ DEG.		43 $\frac{3}{4}$ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	0-73	0-68	0-73	0-69	0-73	0-69	0-72	0-69	1
2	1-46	1-36	1-46	1-37	1-45	1-38	1-44	1-38	2
3	2-19	2-05	2-19	2-06	2-18	2-07	2-17	2-07	3
4	2-93	2-73	2-91	2-74	2-90	2-75	2-89	2-77	4
5	3-66	3-41	3-64	3-43	3-63	3-44	3-61	3-46	5
6	4-39	4-09	4-37	4-11	4-35	4-13	4-33	4-15	6
7	5-12	4-77	5-10	4-80	5-08	4-82	5-06	4-84	7
8	5-85	5-46	5-83	5-48	5-80	5-51	5-78	5-53	8
9	6-58	6-14	6-56	6-17	6-53	6-20	6-50	6-22	9
10	7-31	6-82	7-28	6-85	7-25	6-88	7-22	6-92	10
11	8-04	7-50	8-01	7-54	7-98	7-57	7-95	7-61	11
12	8-78	8-18	8-74	8-22	8-70	8-26	8-67	8-30	12
13	9-51	8-87	9-47	8-91	9-43	8-95	9-39	8-99	13
14	10-24	9-55	10-20	9-59	10-16	9-64	10-11	9-68	14
15	10-97	10-23	10-93	10-28	10-88	10-33	10-84	10-37	15
16	11-70	10-91	11-65	10-96	11-61	11-01	11-56	11-06	16
17	12-43	11-59	12-38	11-65	12-33	11-70	12-28	11-76	17
18	13-16	12-28	13-11	12-33	13-06	12-39	13-00	12-45	18
19	13-90	12-96	13-84	13-02	13-78	13-08	13-72	13-14	19
20	14-63	13-64	14-57	13-70	14-51	13-77	14-45	13-83	20
21	15-36	14-32	15-30	14-39	15-23	14-46	15-17	14-52	21
22	16-09	15-00	16-02	15-07	15-96	15-14	15-89	15-21	22
23	16-82	15-60	16-75	15-76	16-68	15-83	16-51	15-90	23
24	17-55	16-37	17-48	16-44	17-41	16-52	17-34	16-60	24
25	18-28	17-05	18-21	17-13	18-13	17-21	18-06	17-29	25
26	19-02	17-73	18-94	17-81	18-86	17-90	18-78	17-98	26
27	19-75	18-41	19-67	18-50	19-59	18-59	19-50	18-67	27
28	20-48	19-10	20-39	19-19	20-31	19-27	20-23	19-36	28
29	21-21	19-78	21-12	19-87	21-04	19-96	20-95	20-05	29
30	21-94	20-46	21-85	20-56	21-76	20-65	21-67	20-75	30
31	22-67	21-14	22-58	21-24	22-49	21-34	22-39	21-44	31
32	23-40	21-82	23-31	21-93	23-21	22-03	23-12	22-13	32
33	24-13	22-51	24-04	22-61	23-94	22-72	23-84	22-82	33
34	24-87	23-19	24-76	23-30	24-66	23-40	24-56	23-51	34
35	25-60	23-87	25-49	23-98	25-39	24-09	25-28	24-20	35
36	26-33	24-55	26-22	24-67	26-11	24-78	26-01	24-89	36
37	27-06	25-23	26-95	25-35	26-84	25-47	26-73	25-59	37
38	27-79	25-92	27-68	26-04	27-56	26-16	27-45	26-28	38
39	28-52	26-60	28-41	26-72	28-29	26-85	28-17	26-97	39
40	29-25	27-28	29-13	27-41	29-01	27-53	28-89	27-66	40
41	29-99	27-96	29-86	28-09	29-74	28-22	29-62	28-35	41
42	30-72	28-64	30-59	28-78	30-47	28-91	30-34	29-04	42
43	31-45	29-33	31-32	29-46	31-19	29-60	31-06	29-74	43
44	32-18	30-01	32-05	30-15	31-92	30-29	31-78	30-43	44
45	32-91	30-69	32-78	30-83	32-64	30-98	32-51	31-12	45
46	33-64	31-37	33-51	31-52	33-37	31-66	33-23	31-81	46
47	34-37	32-05	34-23	32-20	34-09	32-35	33-95	32-50	47
48	35-10	32-74	34-96	32-89	34-82	33-04	34-67	33-19	48
49	35-84	33-42	35-69	33-57	35-54	33-73	35-40	33-88	49
50	36-57	34-10	36-42	34-26	36-27	34-42	36-12	34-58	50
Distance.	47 DEG.		46 $\frac{3}{4}$ DEG.		46 $\frac{1}{2}$ DEG.		46 $\frac{1}{4}$ DEG.		Distance.
	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	

Distance.	43 DEG.		43½ DEG.		43½ DEG.		43¾ DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	37-30	34-78	37-15	34-94	36-99	35-11	36-84	35-27	51
52	38-03	35-46	37-88	35-63	37-72	35-79	37-56	35-96	52
53	38-67	36-15	38-60	36-31	38-44	36-48	38-29	36-65	53
54	39-49	36-83	39-33	37-00	39-17	37-17	39-01	37-34	54
55	40-22	37-51	40-06	37-69	39-90	37-86	39-73	38-03	55
56	40-96	38-19	40-79	38-37	40-62	38-55	40-45	38-72	56
57	41-69	38-87	41-52	39-06	41-35	39-24	41-17	39-42	57
58	42-42	39-56	42-25	39-74	42-07	39-92	41-90	40-11	58
59	43-15	40-24	42-97	40-43	42-80	40-61	42-62	40-80	59
60	43-88	40-92	43-70	41-11	43-52	41-30	43-34	41-49	60
61	44-61	41-60	44-43	41-80	44-25	41-99	44-06	42-18	61
62	45-34	42-28	45-16	42-48	44-97	42-68	44-79	42-87	62
63	46-08	42-97	45-89	43-17	45-70	43-37	45-51	43-57	63
64	46-81	43-65	46-62	43-85	46-42	44-05	46-23	44-26	64
65	47-54	44-33	47-34	44-54	47-15	44-74	46-95	44-95	65
66	48-27	45-01	48-07	45-22	47-87	45-43	47-68	45-64	66
67	49-00	45-69	48-80	45-91	48-60	46-12	48-40	46-33	67
68	49-73	46-38	49-53	46-59	49-33	46-81	49-12	47-02	68
69	50-56	47-06	50-26	47-28	50-05	47-50	49-84	47-71	69
70	51-19	47-74	50-99	47-96	50-78	48-18	50-57	48-41	70
71	51-93	48-42	51-71	48-65	51-50	48-87	51-29	49-10	71
72	52-66	49-10	52-44	49-33	52-23	49-56	52-01	49-79	72
73	53-39	49-79	53-17	50-02	52-95	50-25	52-73	50-48	73
74	54-12	50-47	53-90	50-70	53-68	50-94	53-45	51-17	74
75	54-85	51-15	54-63	51-39	54-40	51-63	54-18	51-86	75
76	55-58	51-83	55-36	52-07	55-13	52-31	54-90	52-55	76
77	56-31	52-51	56-08	52-76	55-85	53-00	55-62	53-25	77
78	57-05	53-20	56-81	53-44	56-58	53-69	56-34	53-94	78
79	57-78	53-88	57-54	54-13	57-30	54-38	57-07	54-63	79
80	58-51	54-56	58-27	54-81	58-03	55-07	57-79	55-32	80
81	59-24	55-24	59-00	55-50	58-76	55-76	58-51	56-01	81
82	59-97	55-92	59-73	56-18	59-48	56-45	59-23	56-70	82
83	60-70	56-61	60-45	56-87	60-21	57-13	59-96	57-40	83
84	61-43	57-29	61-18	57-56	60-93	57-82	60-68	58-09	84
85	62-17	57-97	61-91	58-24	61-66	58-51	61-40	58-78	85
86	62-90	58-65	62-64	58-93	62-38	59-20	62-12	59-47	86
87	63-63	59-33	63-37	59-61	63-11	59-89	62-85	60-16	87
88	64-36	60-02	64-10	60-30	63-83	60-58	63-57	60-85	88
89	65-09	60-70	64-82	60-98	64-56	61-26	64-29	61-54	89
90	65-82	61-38	65-55	61-67	65-28	61-95	65-01	62-24	90
91	66-55	62-06	66-28	62-35	66-01	62-64	65-74	62-93	91
92	67-28	62-74	67-01	63-04	66-73	63-33	66-46	63-62	92
93	68-02	63-43	67-74	63-72	67-46	64-02	67-18	64-31	93
94	68-75	64-11	68-47	64-41	68-19	64-71	67-90	65-00	94
95	69-48	64-79	69-20	65-09	68-91	65-39	68-62	65-69	95
96	70-21	65-47	69-92	65-78	69-64	66-08	69-35	66-39	96
97	70-94	66-15	70-65	66-46	70-36	66-77	70-07	67-08	97
98	71-67	66-84	71-37	67-15	71-09	67-46	70-79	67-77	98
99	72-40	67-52	72-11	67-83	71-81	68-15	71-51	68-46	99
100	73-14	68-20	72-84	68-52	72-54	68-84	72-24	69-15	100
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	47 DEG.		46½ DEG.		46½ DEG.		46¼ DEG.		

Distance.	44 DEG.		44½ DEG.		44½ DEG.		44¾ DEG.		45 DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
1	0-72	0-69	0-72	0-70	0-71	0-70	0-71	0-71	0-71	0-71	1
2	1-44	1-39	1-43	1-40	1-43	1-40	1-42	1-41	1-41	1-41	2
3	2-16	2-08	2-15	2-09	2-14	2-10	2-13	2-11	2-12	2-12	3
4	2-88	2-78	2-87	2-79	2-85	2-80	2-84	2-82	2-83	2-83	4
5	3-60	3-47	3-58	3-49	3-57	3-50	3-55	3-52	3-54	3-54	5
6	4-32	4-17	4-30	4-19	4-28	4-21	4-26	4-22	4-24	4-24	6
7	5-04	4-86	5-01	4-88	4-99	4-91	4-97	4-93	4-95	4-95	7
8	5-75	5-56	5-73	5-58	5-71	5-61	5-68	5-63	5-66	5-66	8
9	6-47	6-25	6-45	6-28	6-42	6-31	6-39	6-34	6-36	6-36	9
10	7-19	6-95	7-16	6-98	7-13	7-01	7-10	7-04	7-07	7-07	10
11	7-91	7-64	7-88	7-68	7-85	7-71	7-81	7-74	7-78	7-78	11
12	8-63	8-34	8-60	8-37	8-56	8-41	8-52	8-45	8-49	8-49	12
13	9-35	9-03	9-31	9-07	9-27	9-11	9-23	9-15	9-19	9-19	13
14	10-07	9-73	10-03	9-77	9-99	9-81	9-94	9-86	9-90	9-90	14
15	10-79	10-42	10-74	10-47	10-79	10-51	10-65	10-56	10-61	10-61	15
16	11-51	11-11	11-46	11-16	11-41	11-21	11-36	11-26	11-31	11-31	16
17	12-23	11-81	12-18	11-86	12-13	11-92	12-07	11-97	12-02	12-02	17
18	12-95	12-50	12-89	12-56	12-84	12-62	12-78	12-67	12-73	12-73	18
19	13-67	13-20	13-61	13-26	13-55	13-32	13-49	13-38	13-43	13-43	19
20	14-39	13-89	14-33	13-96	14-26	14-02	14-20	14-08	14-14	14-14	20
21	15-11	14-59	15-04	14-65	14-98	14-72	14-91	14-78	14-85	14-85	21
22	15-83	15-28	15-76	15-35	15-69	15-42	15-62	15-49	15-56	15-56	22
23	16-54	15-98	16-47	16-05	16-40	16-12	16-33	16-19	16-26	16-26	23
24	17-26	16-67	17-19	16-75	17-12	16-82	17-04	16-90	16-97	16-97	24
25	17-98	17-37	17-91	17-44	17-83	17-52	17-75	17-60	17-68	17-68	25
26	18-70	18-06	18-62	18-14	18-54	18-22	18-46	18-30	18-38	18-38	26
27	19-42	18-76	19-34	18-84	19-26	18-92	19-17	19-01	19-09	19-09	27
28	20-14	19-45	20-06	19-54	19-97	19-63	19-89	19-71	19-80	19-80	28
29	20-86	20-15	20-77	20-24	20-68	20-33	20-60	20-52	20-51	20-51	29
30	21-58	20-84	21-49	20-93	21-40	21-03	21-31	21-12	21-21	21-21	30
31	22-30	21-53	22-21	21-63	22-11	21-73	22-02	21-82	21-92	21-92	31
32	23-02	22-23	22-92	22-33	22-82	22-43	22-73	22-53	22-63	22-63	32
33	23-74	22-92	23-64	23-03	23-54	23-13	23-44	23-23	23-33	23-33	33
34	24-46	23-62	24-35	23-72	24-25	23-83	24-15	23-94	24-04	24-02	34
35	25-18	24-31	25-07	24-42	24-96	24-53	24-86	24-64	24-75	24-75	35
36	25-90	25-01	25-79	25-12	25-68	25-23	25-57	25-34	25-46	25-46	36
37	26-62	25-70	26-50	25-82	26-39	25-93	26-28	26-05	26-16	26-16	37
38	27-33	26-40	27-22	26-52	27-10	26-63	26-99	26-75	26-87	26-87	38
39	28-05	27-09	27-94	27-21	27-82	27-34	27-70	27-46	27-58	27-58	39
40	28-77	27-79	28-65	27-91	28-53	28-04	28-41	28-16	28-28	28-28	40
41	29-49	28-48	29-37	28-61	29-24	28-74	29-12	28-86	28-99	28-99	41
42	30-21	29-18	30-08	29-31	29-96	29-44	29-83	28-57	29-70	29-70	42
43	30-93	29-87	30-80	30-00	30-67	30-14	30-54	30-27	30-41	30-41	43
44	31-65	30-56	31-52	30-70	31-38	30-84	31-25	30-98	31-11	31-11	44
45	32-37	31-26	32-23	31-40	32-10	31-54	31-96	31-68	31-82	31-82	45
46	33-09	31-95	32-95	32-10	32-81	32-24	32-67	32-38	32-53	32-53	46
47	33-81	32-65	33-67	32-80	33-52	32-94	33-38	33-09	33-23	33-23	47
48	34-53	33-34	34-38	33-49	34-24	33-64	34-09	33-79	33-94	33-94	48
49	35-25	34-04	35-10	34-19	34-95	34-34	34-80	34-50	34-65	34-65	49
50	35-97	34-73	35-82	34-89	35-66	35-05	35-51	35-20	35-36	35-36	50
Distance.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Distance.
	46 DEG.		45½ DEG.		45½ DEG.		45¼ DEG.		45 DEG.		

Distance.	44 DEG.		44½ DEG.		44¾ DEG.		45 DEG.		45 DEG.		Distance.
	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	
51	36-69	35-43	36-53	35-59	36-38	35-75	36-22	35-90	36-06	36-06	51
52	37-41	36-12	37-25	36-29	37-09	36-45	36-93	36-61	36-77	36-77	52
53	38-12	36-32	37-96	36-98	37-80	37-15	37-64	37-31	37-48	37-48	53
54	38-84	37-51	38-68	37-68	38-52	37-85	38-35	38-02	38-18	38-18	54
55	39-56	38-21	39-40	38-38	39-23	38-55	39-06	38-72	38-89	38-89	55
56	40-28	38-90	40-11	39-08	39-94	39-25	39-77	39-42	39-60	39-60	56
57	41-00	39-60	40-83	39-77	40-66	39-95	40-48	40-13	40-31	40-31	57
58	41-72	40-29	41-55	40-47	41-37	40-65	41-19	40-83	41-01	41-01	58
59	42-44	40-98	42-26	41-17	42-08	41-35	41-90	41-54	41-72	41-72	59
60	43-16	41-68	42-98	41-87	42-79	42-05	42-61	42-24	42-43	42-43	60
61	43-88	42-37	43-69	42-57	43-51	42-76	43-32	42-94	43-13	43-13	61
62	44-60	43-07	44-41	43-26	44-22	43-46	44-03	43-65	43-84	43-84	62
63	45-32	43-76	45-13	43-96	44-93	44-16	44-74	44-35	44-55	44-55	63
64	46-04	44-46	45-84	44-66	45-65	44-86	45-45	45-06	45-25	45-25	64
65	46-76	45-15	46-56	45-36	46-36	45-56	46-16	45-76	45-96	45-96	65
66	47-48	45-85	47-28	46-05	47-07	46-26	46-87	46-46	46-67	46-67	66
67	48-20	46-54	47-99	46-75	47-79	46-96	47-58	47-17	47-38	47-38	67
68	48-92	47-24	48-71	47-45	48-50	47-66	48-29	47-87	48-08	48-08	68
69	49-63	47-93	49-42	48-15	49-21	48-36	49-00	48-58	48-79	48-79	69
70	50-35	48-63	50-14	48-85	49-93	49-06	49-71	49-28	49-50	49-50	70
71	51-07	49-32	50-86	49-54	50-64	49-76	50-42	49-98	50-20	50-20	71
72	51-79	50-02	51-57	50-24	51-35	50-47	51-13	50-69	50-91	50-91	72
73	52-51	50-71	52-29	50-94	52-07	51-17	51-84	51-39	51-62	51-62	73
74	53-23	51-40	53-01	51-64	52-78	51-87	52-55	52-10	52-33	52-33	74
75	53-95	52-10	53-72	52-33	53-49	52-57	53-26	52-80	53-03	53-03	75
76	54-67	52-79	54-44	53-03	54-21	53-27	53-97	53-51	53-74	53-74	76
77	55-39	53-49	55-16	53-73	54-92	53-97	54-68	54-21	54-45	54-45	77
78	56-11	54-18	55-87	54-43	55-63	54-67	55-39	54-91	55-15	55-15	78
79	56-83	54-88	56-59	55-13	56-35	55-37	56-10	55-62	55-86	55-86	79
80	57-55	55-57	57-30	55-82	57-06	56-07	56-81	56-32	56-57	56-57	80
81	58-27	56-27	58-02	56-52	57-77	56-77	57-52	57-03	57-28	57-28	81
82	58-99	56-96	58-74	57-22	58-49	57-47	58-24	57-73	57-98	57-98	82
83	59-71	57-56	59-45	57-92	59-20	58-18	58-95	58-43	58-69	58-69	83
84	60-42	58-35	60-17	58-61	59-91	58-88	59-66	59-14	59-40	59-40	84
85	61-14	59-05	60-89	59-31	60-63	59-58	60-37	59-84	60-10	60-10	85
86	61-86	59-74	61-60	60-01	61-34	60-28	61-08	60-55	60-81	60-81	86
87	62-58	60-44	62-32	60-71	62-05	60-98	61-79	61-25	61-52	61-52	87
88	63-30	61-13	63-03	61-41	62-77	61-68	62-50	61-95	62-23	62-23	88
89	64-02	61-82	63-75	62-10	63-48	62-38	63-21	62-66	62-93	62-93	89
90	64-74	62-52	64-47	62-80	64-19	63-08	63-92	63-36	63-64	63-64	90
91	65-46	63-21	65-18	63-50	64-91	63-78	64-63	64-07	64-35	64-35	91
92	66-18	63-91	65-90	64-20	65-62	64-48	65-34	64-77	65-05	65-05	92
93	66-90	64-60	66-62	64-89	66-33	65-18	66-05	65-47	65-76	65-76	93
94	67-62	65-30	67-33	65-59	67-05	65-89	66-76	66-18	66-47	66-47	94
95	68-34	65-99	68-05	66-29	67-76	66-59	67-47	66-88	67-18	67-18	95
96	69-06	66-69	68-76	66-99	68-47	67-29	68-18	67-59	67-88	67-88	96
97	69-78	67-38	69-48	67-69	69-19	67-99	68-89	68-29	68-59	68-59	97
98	70-50	68-08	70-20	68-38	69-90	68-69	69-60	68-99	69-30	69-30	98
99	71-21	68-77	70-91	69-08	70-61	69-39	70-31	69-70	70-00	70-00	99
100	71-93	69-47	71-63	69-78	71-33	70-09	71-02	70-40	70-71	70-71	100
Distance.	46 DEG.		45½ DEG.		45¾ DEG.		45 DEG.		45 DEG.		Distance.
	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	Dep.	Lat.	

	0°	1°	2°	3°	4°	5°	6°	7°	8°	9°	
0	000000	017452	034899	052336	069756	087156	104528	121869	139173	156434	60
5	1454	8907	6353	3788	071207	8605	5975	3313	140613	7871	55
10	2909	020361	7806	5241	2658	090053	7421	4756	2053	9307	50
15	4363	1815	9260	6693	4108	1502	8867	6199	3493	160743	45
20	5818	3269	040713	8145	5559	2950	110313	7642	4932	2178	40
25	7272	4723	2166	9597	7009	4398	1758	9084	6371	3613	35
30	8727	6177	3619	061049	8459	5846	3263	130526	7809	5048	30
35	010181	7631	5072	2500	9909	7293	4648	1968	9248	6482	25
40	1635	9085	6525	3952	081359	8741	6093	3410	150686	7916	20
45	3090	030539	7978	5403	2808	100188	7537	4851	2123	9350	15
50	4544	1992	9431	6854	4258	1635	8982	6292	3561	170783	10
55	5998	3446	050883	8306	5707	3082	120426	7733	4908	2216	5
60	7452	4899	2336	9756	7156	4528	1869	9173	6434	3648	0
Cos.	89°	88°	87°	86°	85°	84°	83°	82°	81°	80°	
	10°	11°	12°	13°	14°	15°	16°	17°	18°	19°	
0	173648	190809	207912	224951	241922	258819	275637	292372	309017	325568	60
5	5080	2237	9334	6368	3333	260224	7035	3762	310400	6943	55
10	6512	3664	210756	7784	4743	1628	8432	5152	1782	8317	50
15	7944	5090	2178	9200	6153	3031	9829	6542	3164	9691	45
20	9375	6517	3599	230616	7563	4434	281225	7930	4545	331063	40
25	180805	7942	5019	2031	8972	5837	2620	9318	5925	2435	35
30	2236	9368	6440	3445	250380	7298	4015	300706	7305	3807	30
35	3665	200793	7859	4859	1788	8640	5410	2993	8684	5178	25
40	5095	2218	9279	6273	3195	270040	6803	3479	320062	6547	20
45	6524	3642	220697	7686	4602	1440	8196	4864	1439	7917	15
50	7953	5065	2116	9098	6008	2840	9589	6249	2816	9285	10
55	9381	6489	3534	240510	7414	4239	290981	7633	4193	340653	5
60	190809	7912	4951	1922	8819	5637	2372	9017	5568	2020	0
Cos.	79°	78°	77°	76°	75°	74°	73°	72°	71°	70°	
	20°	21°	22°	23°	24°	25°	26°	27°	28°	29°	
0	342020	358368	374607	390731	406737	422618	438371	453990	469472	484810	60
5	3387	9725	5955	2070	8065	3936	9678	5286	470755	6081	55
10	4752	361082	7302	3407	9392	5253	440984	6580	2038	7352	50
15	6117	2438	8649	4744	410719	6569	2229	7874	3320	8621	45
20	7481	3793	9994	6080	2045	7884	3593	9166	4600	9890	40
25	8845	5148	381339	7415	3368	9198	4896	460458	5880	491157	35
30	350207	6501	2683	8749	4693	430511	6198	1749	7159	2424	30
35	1569	7854	4027	400082	6016	1823	7499	3038	8436	3689	25
40	2931	9206	5369	1415	7338	3135	8799	4327	9713	4953	20
45	4291	370557	6711	2747	8660	4445	450098	5615	480989	6217	15
50	5651	1908	8052	4078	9980	5755	1397	6901	2263	7479	10
55	7010	3258	9392	5408	421300	7063	2394	8187	3537	8740	5
60	8368	4607	390731	6737	2618	8371	3899	9472	4810	500000	0
Cos.	69°	68°	67°	66°	65°	64°	63°	62°	61°	60°	
	30°	31°	32°	33°	34°	35°	36°	37°	38°	39°	
0	500000	515038	529919	544629	559193	573576	587785	601815	615661	629320	60
5	1259	6284	531152	8588	560398	4767	8261	2976	6807	630450	55
10	2517	7529	2384	7076	1602	5957	590136	4136	7951	1578	50
15	3774	8773	3615	8293	2805	7145	1310	5294	9094	2705	45
20	5030	520016	4844	9509	4007	8332	2482	6451	620235	3831	40
25	6285	1258	6072	550724	5207	9518	3653	7607	1376	4955	35
30	7538	2499	7300	1937	6406	580703	4823	8761	2515	6078	30
35	8791	3738	8526	3149	7604	1886	5991	9915	3652	7290	25
40	510043	4977	9751	4360	8801	3069	7159	611067	4789	8320	20
45	1293	6214	540974	5570	9997	4250	8325	2217	5923	9439	15
50	2543	7450	2197	6779	571191	5429	9489	3367	7057	640557	10
55	3791	8685	3419	7987	2384	6608	600653	4515	8189	1673	5
60	5038	9919	4639	9193	3576	7785	1815	5661	9320	2788	0
	59°	58°	57°	56°	55°	54°	53°	52°	51°	50°	

Natural Cosines.

	40°	41°	42°	43°	44°	45°	46°	47°	48°	49°	
0	642788	656059	669131	681998	694658	707107	719340	731354	743145	754710	60
5	3901	7156	670211	3061	5704	8131	720349	2345	4117	5663	55
10	5013	8252	1289	4123	6748	9161	1357	3334	5088	6615	50
15	6124	9346	2367	5183	7790	710185	2364	4323	6057	7565	45
20	7233	660439	3413	6242	8832	1209	3369	5309	7025	8514	40
25	8341	1530	4517	7299	9871	2230	4372	6294	7991	9461	35
30	9448	2620	5590	8355	700909	3250	5374	7277	8956	760406	30
35	650553	3709	6662	9409	1946	4269	6375	8259	9919	1350	25
40	1657	4796	7732	690462	2981	5286	7374	9239	750889	2292	20
45	2760	5882	8801	1513	4015	6302	8371	740218	1840	3232	15
50	3861	6966	9868	2563	5047	7316	9367	1195	2798	4171	10
55	4961	8049	680934	3611	6078	8329	730361	2171	3755	5109	5
60	6059	9131	1998	4658	7107	9340	1354	3145	4710	6044	0
Cos.	49°	48°	47°	46°	45°	44°	43°	42°	41°	40°	
Sin.	50°	51°	52°	53°	54°	55°	56°	57°	58°	59°	
0	766044	777146	788011	798636	809917	819152	829038	838671	848048	857167	60
5	6979	8060	8905	9510	9871	9985	9850	9462	8818	7915	55
10	7911	8973	9798	800383	810723	820817	830661	840251	85068	8662	50
15	8842	9884	790690	1254	1574	1647	1470	1029	850352	9406	45
20	9771	780794	1579	2123	2423	2475	2277	1825	1117	860149	40
25	770699	1702	2467	2991	3270	3302	3082	2669	1879	0899	35
30	10625	2608	3353	3857	4116	4126	3886	3391	2640	1629	30
35	2549	3513	4238	4721	4959	4949	4688	4172	3399	2366	25
40	3472	4416	5121	5584	5801	5770	5488	4951	4156	3102	20
45	4393	5317	6002	6445	6642	6590	6286	5728	4912	3836	15
50	5312	6217	6882	7304	7480	7407	7083	6503	5665	4567	10
55	6230	7114	7759	8161	8317	8223	7878	7277	6417	5297	5
60	7146	8011	8636	9017	9152	9038	8671	8048	7167	6025	0
Cos.	39°	38°	37°	36°	35°	34°	33°	32°	31°	30°	
Sin.	60°	61°	62°	63°	64°	65°	66°	67°	68°	69°	
0	866025	874620	882948	891007	898794	906308	913545	920505	927184	933580	60
5	6752	5324	3629	1666	9431	6922	4136	1072	7728	4101	55
10	7476	6026	4309	2323	90065	7533	4725	1638	8270	4619	50
15	8199	6727	4988	2979	0698	8143	5311	2201	8810	5135	45
20	8920	7425	5664	3633	1329	8751	5896	2762	9348	5650	40
25	9639	8122	6338	4284	1958	9357	6479	3322	9884	6162	35
30	870356	8817	7011	4934	2585	9961	7060	3383	930418	6672	30
35	1071	9510	7681	5582	3210	910563	7639	4435	0950	7181	25
40	1784	880201	8350	6229	3834	1164	8216	4929	1480	7687	20
45	2496	0891	9017	6873	4455	1762	8791	5541	2068	8191	15
50	3206	1578	9682	7515	5075	2358	9364	6090	2534	8694	10
55	3914	2264	899345	8156	5692	2953	9936	6538	3058	9194	5
60	4620	2948	1007	8794	6308	3545	920505	7184	3580	9693	0
Cos.	29°	28°	27°	26°	25°	24°	23°	22°	21°	20°	
Sin.	70°	71°	72°	73°	74°	75°	76°	77°	78°	79°	
0	939693	945519	951037	956305	961262	965926	970296	974370	978148	981627	60
5	940189	5991	1505	6729	1662	6301	0647	4696	8449	1904	55
10	0634	6462	1951	7151	2059	6675	0995	5020	8748	2178	50
15	1176	6930	2396	7571	2455	7046	1342	5342	9045	2450	45
20	1666	7397	2838	7990	2849	7415	1687	5662	9341	2721	40
25	2155	7861	3279	8406	3241	7782	2029	5980	9634	2980	35
30	2641	8324	3717	8820	3630	8148	2370	6296	9925	3255	30
35	3126	8784	4153	9232	4018	8511	2708	6610	980214	3519	25
40	3609	9243	4588	9642	4404	8872	3045	6921	0500	3781	20
45	4089	9699	5020	960050	4787	9231	3379	7231	0785	4041	15
50	4563	950154	5450	0456	5169	9588	3712	7539	1068	4298	10
55	5044	0606	5879	0830	5548	9943	4042	7844	1349	4554	5
60	5519	1957	6305	1262	5926	970296	4370	8148	1627	4808	0
	19°	18°	17°	16°	15°	14°	13°	12°	11°	10°	

Natural Cosines.

	80°	81°	82°	83°	84°	85°	86°	87°	88°	89°	
0	984808	987688	990268	992546	994522	996195	997564	998630	999391	999848	60
5	5059	7915	0469	2722	4673	6320	7664	8705	9441	9872	55
10	5309	8139	0669	2896	4822	6444	7763	8778	9488	9894	50
15	5556	8362	0866	3068	4969	6566	7953	8848	9534	9914	45
20	5801	8582	1061	3238	5113	6685	7953	8917	9577	9932	40
25	6045	8800	1254	3406	5256	6802	8045	8984	9618	9948	35
30	6286	9016	1445	3572	5396	6917	8135	9048	9657	9962	30
35	6525	9230	1634	3735	5535	7030	8223	9111	9694	9974	25
40	6762	9442	1820	3897	5671	7141	8308	9171	9729	9983	20
45	6996	9651	2005	4056	5805	7250	8392	9229	9762	9990	15
50	7229	9859	2187	4214	5937	7357	8473	9285	9793	9996	10
55	7460	99065	2368	4369	6067	7462	8552	9239	9821	9999	5
60	7688	9968	2546	4522	6195	7564	8630	9391	9848	100000	0
Cos.	9°	8°	7°	6°	5°	4°	3°	2°	1°	0°	

Natural Cosines.

TABLE OF NATURAL TANGENTS.

	0°	1°	2°	3°	4°	5°	6°	7°	8°	9°	
0	000000	017455	034921	052408	069927	087489	105104	122785	140541	158384	60
5	1454	8910	6377	3866	071389	8954	6575	4261	2024	9876	55
10	2909	620365	7834	5325	2851	090421	8046	5738	3508	161368	50
15	4363	1820	9290	6784	4313	1887	9518	7216	4993	2860	45
20	5818	3275	040747	8243	5775	3354	110990	8694	6478	4354	40
25	7272	4731	2204	9703	7238	4821	2463	130173	7964	5848	35
30	8727	6186	3661	061163	8702	6289	3936	1652	9451	7343	30
35	010181	7641	5118	2923	080165	7757	5409	3132	150938	8838	25
40	1636	9697	6576	4083	1629	9226	6883	4613	2426	170334	20
45	3091	030553	8033	5513	3094	100695	8358	6094	3915	1831	15
50	4545	2009	9491	7004	4558	2164	9833	7576	5404	3329	10
55	6000	3465	050949	8465	6023	3634	121309	9058	6894	4828	5
60	7455	4921	2408	9927	7489	5104	2785	140541	8384	6327	0
Cot.	89°	88°	87°	86°	85°	84°	83°	82°	81°	80°	
Tan.	10°	11°	12°	13°	14°	15°	16°	17°	18°	19°	
0	176327	194380	212557	230868	249328	267949	286745	305731	324920	344328	60
5	7827	5890	4077	2401	250873	9509	8320	7322	6528	5955	55
10	9328	7401	5599	3934	2420	271069	9896	8914	8139	7585	50
15	180830	8912	7121	5469	3968	2631	291473	310568	9751	9216	45
20	2232	200425	8645	7004	5517	4194	3052	2104	331364	350848	40
25	3835	1938	220169	8741	7066	5759	4632	3701	2979	2483	35
30	5339	3452	1695	240079	8618	7325	6214	5299	4595	4119	30
35	6844	4967	3221	1618	260170	8892	7796	6899	6213	5756	25
40	8350	6483	4749	3157	1723	280460	9380	8500	7833	7396	20
45	9856	8000	6277	4698	3278	2029	300966	320103	9454	9037	15
50	191363	9518	7806	6241	4834	3600	2553	1707	341077	360680	10
55	2871	211037	9337	7784	6391	5172	4141	3313	2702	2324	5
60	4380	2557	230868	9328	7949	6745	5731	4920	4328	3970	0
Cot.	79°	78°	77°	76°	75°	74°	73°	72°	71°	70°	
Tan.	20°	21°	22°	23°	24°	25°	26°	27°	28°	29°	
0	363970	383864	404026	424475	445229	466308	487733	509525	531709	554309	60
5	5618	5534	5719	6192	6973	8080	9534	511349	3577	6212	55
10	7268	7205	7414	7912	8719	9854	491339	3195	5447	8118	50
15	8920	8879	9111	9634	450467	471631	3145	5034	7319	560027	45
20	370573	390554	410810	431358	2218	3410	4955	6876	9195	1939	40
25	2228	2231	2511	3084	3971	5191	6767	8720	541074	3854	35
30	3885	3910	4214	4812	5726	6976	8582	520567	2956	5773	30
35	5543	5592	5919	6543	7484	8762	500399	2417	4840	7694	25
40	7204	7275	7626	8276	9244	480551	2219	4270	6728	9619	20
45	8866	8960	9335	440011	461006	2343	4042	6126	8619	571547	15
50	380530	400646	421046	1748	2771	4137	5467	7984	550513	3478	10
55	2196	2335	2759	3487	4538	5933	7695	9845	2409	5413	5
60	3864	4026	4475	5229	6308	7733	9525	531709	4309	7350	0
	69°	68°	67°	66°	65°	64°	63°	62°	61°	60°	

Natural Cotangents.

	30°	31°	32°	33°	34°	35°	36°	37°	'
0	577350	600861	624869	649408	674509	700208	726543	753554	60
5	9291	2842	6894	651477	6627	2377	8767	5837	55
10	531235	4827	8921	3551	8749	4551	730996	8125	50
15	3183	6815	630953	5629	680876	6730	3230	760418	45
20	5134	8807	2988	7710	3007	8913	5469	2716	40
25	7088	610862	5027	9796	5142	711101	7713	5019	35
30	9045	2801	7070	661886	7281	3293	9961	7327	30
35	591006	4803	9117	3979	9425	5430	742214	9640	25
40	2970	6809	641167	6077	691572	7691	4472	771959	20
45	4938	8819	3222	8179	3725	9897	6735	4283	15
50	6908	620832	5280	670285	5881	722108	9003	6612	10
55	8883	2849	7342	2394	8042	4323	751276	8946	5
60	600861	4869	9408	4509	700208	6543	3554	781286	0

Cot.	59°	58°	57°	56°	55°	54°	53°	52°	
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Tan.	38°	39°	40°	41°	42°	43°	44°	45°	
0	781286	809784	839100	869287	900404	932515	965689	1.000000	60
5	3631	812195	841581	871844	3041	5238	8504	002913	55
10	5981	4612	4069	4407	5685	7968	971326	005835	50
15	8336	7034	6563	6977	8336	940706	4157	008765	45
20	790698	9463	9062	9553	910994	3451	6996	011704	40
25	3064	821897	851568	882136	3659	6204	9842	014651	35
30	5436	4336	4081	4725	6331	8965	982697	017607	30
35	7813	6782	6599	7322	9010	951733	5560	020572	25
40	800196	9234	9124	9924	921697	4508	8432	023546	20
45	2585	831691	861655	892534	4391	7292	991311	026529	15
50	4979	4155	4193	5151	7091	960083	4199	029520	10
55	7379	6624	6736	7774	9800	2882	7095	032521	5
60	9784	9100	9287	900404	932515	5689	1.000000	035530	0

Cot.	51°	50°	49°	48°	47°	46°	45°	44°	
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Tan.	46°	47°	48°	49°	50°	51°	52°	53°	
0	1.035530	1.072369	1.110613	1.150368	1.191754	1.234897	1.279942	1.327045	60
5	038549	075501	113866	153753	195280	238576	283786	331068	55
10	041577	078642	117131	157150	198818	242269	287645	335108	50
15	044614	081794	120405	160557	202360	245974	291518	339162	45
20	047660	084955	123691	163076	205933	249693	295406	343233	40
25	050715	088127	126987	167407	209509	253426	299308	347320	35
30	053780	091309	130294	170850	213097	257172	303225	351422	30
35	056854	094500	133612	174304	216698	260932	307158	355541	25
40	059938	097702	136941	177770	220312	264706	311105	359676	20
45	063031	100914	140282	181248	223939	268494	315067	363828	15
50	066134	104137	143633	184738	227579	272296	319044	367996	10
55	069247	107369	146995	188240	231231	276112	323037	372181	5
60	072369	110613	150368	191754	234897	279942	327045	376382	0

Cot.	43°	42°	41°	40°	39°	38°	37°	36°	
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Tan.	54°	55°	56°	57°	58°	59°	60°	61°	
0	1.376382	1.428148	1.482561	1.539865	1.600335	1.664280	1.732051	1.804048	60
5	380600	432578	487222	544779	605526	669776	737883	810252	55
10	384835	437027	491904	549716	610742	675299	743745	816489	50
15	389088	441494	496606	554674	615982	680849	749637	822759	45
20	393357	445980	501328	559655	621247	686426	755559	829063	40
25	397644	450485	506071	564659	626537	692031	761511	835400	35
30	401948	455009	510835	569686	631852	697663	767494	841771	30
35	406270	459552	515620	574735	637192	703323	773508	848176	25
40	410610	464115	520426	579808	642558	709012	779552	854616	20
45	414967	468697	525254	584904	647949	714728	785629	861091	15
50	419343	473298	530102	590024	653366	720474	791736	867600	10
55	423736	477920	534973	595167	658810	726248	797876	874146	5
60	428148	482561	539865	600335	664280	732051	804048	880727	0

	35°	34°	33°	32°	31°	30°	29°	28°	'
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Natural Cotangents.

	62°	63°	64°	65°	66°	67°	68°	69°	
0	1.880727	1.962611	2.050304	2.144507	2.246037	2.355852	2.475087	2.605089	60
5	887344	969687	057895	152676	254857	365412	485489	616457	55
10	893997	976805	065532	160896	263736	375037	495966	627912	50
15	900687	983964	073215	169168	272673	384729	506520	639455	45
20	907415	991164	080944	177492	281669	394489	517151	651087	40
25	914179	998406	088720	185869	290726	404317	527860	662809	35
30	920982	2.005690	096544	194300	299843	414214	538648	674622	30
35	927823	013016	104415	202784	309021	424180	549516	686527	25
40	934702	020386	112335	211323	318261	434217	560465	698525	20
45	941620	027799	120303	219918	327563	444326	571496	710619	15
50	948577	035257	128321	228568	336929	454506	582609	722808	10
55	955574	042758	136389	237274	346358	464760	593807	735093	5
60	962611	050304	144507	246037	355852	475087	605089	747477	0
Cot.	27°	26°	25°	24°	23°	22°	21°	20°	
	70°	71°	72°	73°	74°	75°	76°	77°	
0	2.747477	2.904211	3.077684	3.270853	3.487414	3.732051	4.010781	4.331476	60
5	759961	917991	092983	287949	506656	753882	035778	360400	55
10	772545	931889	108421	305209	526094	775952	061070	389694	50
15	785231	945905	123999	322636	545733	798266	086663	419364	45
20	798020	960042	139719	340233	565575	820828	112561	449418	40
25	810913	974302	155584	358001	585624	843642	138772	479864	35
30	823913	988685	171595	375943	605884	866713	165300	510709	30
35	837020	3.003194	187754	394063	626357	890045	192151	541961	25
40	850235	017830	204064	412363	647047	913642	219332	573629	20
45	863560	032595	220526	430845	667958	937509	246848	605721	15
50	876997	047492	237144	449512	689093	961652	274707	638246	10
55	890547	062520	253918	468368	710456	986074	302914	671212	5
60	904211	077684	270853	487414	732051	4.010781	331476	704630	0
Cot.	19°	18°	17°	16°	15°	14°	13°	12°	
	78°	79°	80°	81°	82°	83°	84°	85°	
0	4.704630	5.144554	5.671282	6.313752	7.115370	8.144346	9.514365	11.433005	60
5	738508	184804	719917	373736	191246	243449	649348	62476	55
10	772857	225065	760369	434843	268726	344956	788173	82617	50
15	807685	267152	819657	497104	347861	448957	931009	12.03462	45
20	843005	309279	870804	560554	429706	555547	10.07803	25051	40
25	878825	352063	922832	625262	511318	664822	12943	47422	35
30	915157	395517	975764	691156	595754	776887	38540	70620	30
35	952013	439659	6.029625	758383	682077	891851	54615	94692	25
40	989403	484505	084438	826944	770351	9.009826	71191	13.19688	20
45	5.027340	530072	140230	896880	860642	130935	88292	45663	15
50	065835	576379	197028	968234	953022	255304	11.05943	72674	10
55	104902	623442	254859	7.041048	8.047565	383066	24171	14.00786	5
60	144554	671282	313752	115370	144346	514365	43005	30067	0
Cot.	11°	10°	9°	8°	7°	6°	5°	4°	
	86°	Diff.	87°	Diff.	88°	Diff.	89°	Diff.	
0	14.30067	30525	19.08114	54616	28.63825	1.24605	57.28996	5.20919	60
5	60592	31850	62730	57825	29.88230	1.35928	62.49915	6.25094	55
10	92442	33263	20.20555	61328	31.24158	1.48868	68.75009	7.63992	50
15	15.25705	34773	81883	65157	32.73926	1.63751	76.39001	9.54978	45
20	60478	36389	21.47040	69358	34.36777	1.80983	85.93979	12.2782	40
25	96867	38119	22.16398	73979	36.17760	2.01086	98.21794	16.3708	35
30	16.34986	39975	90377	79077	38.18846	2.24738	114.5887	22.9188	30
35	74961	41973	23.69454	84722	40.43584	2.52824	137.5075	34.3779	25
40	17.16934	44122	24.54176	90994	42.96408	2.86527	171.8854	57.2963	20
45	61056	46442	25.45170	97990	45.82935	3.27453	229.1817	114.5920	15
50	18.07498	48949	26.43160	1.05825	49.10388	3.77823	343.7737	343.7752	10
55	56447	51667	27.48985	1.14640	52.88211	4.40785	687.5489	Infinite.	5
60	19.08114		28.63625		57.28996		Infinite.	Infinite.	0
	3°	Diff.	2°	Diff.	1°	Diff.	0°	Diff.	

Natural Cotangents.

TABLE

OF

THE AREAS OF THE ZONES OF A CIRCLE.

Versed Sine.	Area of Segment.	Versed Sine.	Area of Segment.	Versed Sine.	Area of Segment.	Versed Sine.	Area of Segment.	Versed Sine.	Area of Segment.
·001	·00100	·051	·05091	·101	·10030	·151	·14867	·201	·19544
·002	·00200	·052	·05190	·102	·10128	·152	·14962	·202	·19636
·003	·00300	·053	·05290	·103	·10226	·153	·15057	·203	·19727
·004	·00400	·054	·05389	·104	·10324	·154	·15153	·204	·19819
·005	·00500	·055	·05489	·105	·10422	·155	·15248	·205	·19910
·006	·00600	·056	·05588	·106	·10520	·156	·15343	·206	·20001
·007	·00700	·057	·05687	·107	·10617	·157	·15438	·207	·20092
·008	·00800	·058	·05787	·108	·10715	·158	·15533	·208	·20183
·009	·00900	·059	·05886	·109	·10813	·159	·15627	·209	·20274
·010	·01000	·060	·05985	·110	·10910	·160	·15722	·210	·20365
·011	·01100	·061	·06084	·111	·11008	·161	·15817	·211	·20455
·012	·01199	·062	·06184	·112	·11105	·162	·15911	·212	·20546
·013	·01299	·063	·06283	·113	·11203	·163	·16006	·213	·20637
·014	·01399	·064	·06382	·114	·11300	·164	·16101	·214	·20727
·015	·01499	·065	·06481	·115	·11397	·165	·16195	·215	·20817
·016	·01599	·066	·06580	·116	·11495	·166	·16289	·216	·20908
·017	·01699	·067	·06679	·117	·11592	·167	·16384	·217	·20998
·018	·01799	·068	·06779	·118	·11689	·168	·16478	·218	·21088
·019	·01899	·069	·06878	·119	·11786	·169	·16572	·219	·21178
·020	·01999	·070	·06977	·120	·11883	·170	·16666	·220	·21268
·021	·02099	·071	·07076	·121	·11980	·171	·16760	·221	·21357
·022	·02199	·072	·07175	·122	·12077	·172	·16854	·222	·21447
·023	·02299	·073	·07274	·123	·12174	·173	·16948	·223	·21536
·024	·02399	·074	·07372	·124	·12271	·174	·17042	·224	·21626
·025	·02499	·075	·07471	·125	·12368	·175	·17135	·225	·21715
·026	·02598	·076	·07570	·126	·12465	·176	·17229	·226	·21805
·027	·02698	·077	·07669	·127	·12562	·177	·17323	·227	·21894
·028	·02798	·078	·07768	·128	·12658	·178	·17416	·228	·21983
·029	·02898	·079	·07867	·129	·12755	·179	·17510	·229	·22072
·030	·02998	·080	·07965	·130	·12852	·180	·17603	·230	·22161
·031	·03098	·081	·08064	·131	·12948	·181	·17696	·231	·22249
·032	·03197	·082	·08163	·132	·13045	·182	·17789	·232	·22335
·033	·03297	·083	·08261	·133	·13141	·183	·17882	·233	·22426
·034	·03397	·084	·08360	·134	·13237	·184	·17975	·234	·22515
·035	·03497	·085	·08458	·135	·13334	·185	·18068	·235	·22603
·036	·03596	·086	·08557	·136	·13430	·186	·18161	·236	·22691
·037	·03696	·087	·08655	·137	·13526	·187	·18254	·237	·22780
·038	·03796	·088	·08754	·138	·13622	·188	·18347	·238	·22868
·039	·03896	·089	·08852	·139	·13718	·189	·18439	·239	·22955
·040	·03995	·090	·08951	·140	·13814	·190	·18532	·240	·23043
·041	·04095	·091	·09049	·141	·13910	·191	·18624	·241	·23131
·042	·04195	·092	·09147	·142	·14006	·192	·18717	·242	·23218
·043	·04294	·093	·09246	·143	·14102	·193	·18809	·243	·23306
·044	·04394	·094	·09344	·144	·14198	·194	·18901	·244	·23393
·045	·04494	·095	·09442	·145	·14294	·195	·18993	·245	·23480
·046	·04593	·096	·09540	·146	·14389	·196	·19085	·246	·23568
·047	·04693	·097	·09638	·147	·14485	·197	·19177	·247	·23655
·048	·04792	·098	·09736	·148	·14581	·198	·19269	·248	·23741
·049	·04892	·099	·09835	·149	·14676	·199	·19361	·249	·23828
·050	·04991	·100	·09933	·150	·14771	·200	·19453	·250	·23915

Versed Sine.	Area of Segment.	Versed Sine.	Area of Segment.	Versed Sine.	Area of Segment.	Versed Sine.	Area of Segment.	Versed Sine.	Area of Segment.
251	24001	301	28167	351	31953	401	35242	451	37845
252	24088	302	28247	352	32024	402	35301	452	37888
253	24174	303	28326	353	32095	403	35361	453	37930
254	24260	304	28406	354	32166	404	35420	454	37972
255	24346	305	28485	355	32237	405	35479	455	38014
256	24432	306	28564	356	32307	406	35537	456	38055
257	24518	307	28643	357	32377	407	35595	457	38096
258	24604	308	28722	358	32447	408	35653	458	38136
259	24690	309	28801	359	32517	409	35711	459	38176
260	24775	310	28879	360	32586	410	35768	460	38216
261	24860	311	28958	361	32655	411	35825	461	38255
262	24946	312	29036	362	32725	412	35882	462	38293
263	25031	313	29114	363	32793	413	35939	463	38331
264	25116	314	29192	364	32862	414	35995	464	38369
265	25201	315	29270	365	32931	415	36051	465	38406
266	25285	316	29347	366	32999	416	36107	466	38442
267	25370	317	29425	367	33067	417	36162	467	38478
268	25454	318	29502	368	33135	418	36217	468	38514
269	25539	319	29579	369	33202	419	36272	469	38549
270	25623	320	29656	370	33270	420	36326	470	38583
271	25707	321	29733	371	33337	421	36380	471	38617
272	25791	322	29809	372	33404	422	36434	472	38650
273	25875	323	29886	373	33470	423	36487	473	38683
274	25959	324	29962	374	33537	424	36541	474	38715
275	26042	325	30038	375	33603	425	36593	475	38746
276	26126	326	30114	376	33669	426	36646	476	38777
277	26209	327	30190	377	33735	427	36698	477	38808
278	26292	328	30265	378	33801	428	36750	478	38837
279	26375	329	30341	379	33866	429	36801	479	38866
280	26458	330	30416	380	33931	430	36853	480	38895
281	26541	331	30491	381	33996	431	36904	481	38922
282	26624	332	30566	382	34060	432	36954	482	38949
283	26706	333	30641	383	34125	433	37004	483	38975
284	26788	334	30715	384	34189	434	37054	484	39001
285	26871	335	30789	385	34253	435	37104	485	39026
286	26953	336	30864	386	34317	436	37153	486	39050
287	27035	337	30937	387	34380	437	37201	487	39073
288	27117	338	31011	388	34443	438	37250	488	39095
289	27198	339	31085	389	34506	439	37298	489	39116
290	27280	340	31158	390	34569	440	37346	490	39137
291	27361	341	31231	391	34631	441	37393	491	39156
292	27442	342	31305	392	34694	442	37440	492	39174
293	27523	343	31377	393	34756	443	37486	493	39190
294	27604	344	31450	394	34817	444	37533	494	39208
295	27685	345	31523	395	34879	445	37578	495	39222
296	27766	346	31595	396	34940	446	37624	496	39236
297	27846	347	31667	397	35001	447	37669	497	39248
298	27927	348	31739	398	35061	448	37713	498	39258
299	28007	349	31811	399	35122	449	37758	499	39265
300	28087	350	31882	400	35182	450	37801	500	39269

USE OF THE ABOVE TABLE.

TO FIND THE AREA OF A CIRCULAR ZONE.—*Rule 1.* When the zone is less than a semicircle, divide the height by the longest chord, and seek the quotient in the column of versed sines. Take out the corresponding area, in the next column on the right hand, and multiply it by the square of the longest chord: the product will be the area of the zone.

Example. Required the area of a zone, whose longest chord is 50, and height 15.

$15 \div 50 = .300$: and .300, as per table, = .28087.

Hence, $.28087 \times 50^2 = 702.19$, the area of the zone.

Rule 2. When the zone is greater than a semicircle, take the height on each side of the diameter of the circle, and find, by Rule 1, their respective areas: the areas of these two portions, added together, will be the area of the zone.

TABLE

OF

THE AREAS OF THE SEGMENTS OF A CIRCLE,

The Diameter of which is Unity, and supposed to be divided into 1000 equal Parts.

Height.	Area.	Height.	Area.	Height.	Area.	Height.	Area.	Height.	Area.
·001	·000042	·051	·015119	·101	·041477	·151	·074590	·201	·112625
·002	·000119	·052	·015561	·102	·042081	·152	·075307	·202	·113427
·003	·000219	·053	·016008	·103	·042687	·153	·076026	·203	·114231
·004	·000337	·054	·016458	·104	·043296	·154	·076747	·204	·115036
·005	·000471	·055	·016912	·105	·043908	·155	·077470	·205	·115842
·006	·000619	·056	·017369	·106	·044523	·156	·078194	·206	·116651
·007	·000779	·057	·017831	·107	·045140	·157	·078921	·207	·117460
·008	·000952	·058	·018297	·108	·045759	·158	·079650	·208	·118271
·009	·001135	·059	·018766	·109	·046381	·159	·080380	·209	·119083
·010	·001329	·060	·019239	·110	·047006	·160	·081112	·210	·119898
·011	·001533	·061	·019716	·111	·047633	·161	·081847	·211	·120713
·012	·001746	·062	·020197	·112	·048262	·162	·082582	·212	·121530
·013	·001969	·063	·020681	·113	·048894	·163	·083320	·213	·122348
·014	·002199	·064	·021168	·114	·049529	·164	·084060	·214	·123167
·015	·002438	·065	·021660	·115	·050165	·165	·084801	·215	·123988
·016	·002685	·066	·022155	·116	·050805	·166	·085545	·216	·124811
·017	·002940	·067	·022653	·117	·051446	·167	·086290	·217	·125634
·018	·003202	·068	·023155	·118	·052090	·168	·087037	·218	·126459
·019	·003472	·069	·023660	·119	·052737	·169	·087785	·219	·127286
·020	·003749	·070	·024168	·120	·053385	·170	·088536	·220	·128114
·021	·004032	·071	·024680	·121	·054037	·171	·089288	·221	·128943
·022	·004322	·072	·025196	·122	·054690	·172	·090042	·222	·129773
·023	·004619	·073	·025714	·123	·055346	·173	·090797	·223	·130605
·024	·004922	·074	·026236	·124	·056004	·174	·091555	·224	·131438
·025	·005231	·075	·026761	·125	·056664	·175	·092314	·225	·132273
·026	·005546	·076	·027290	·126	·057327	·176	·093074	·226	·133109
·027	·005867	·077	·027821	·127	·057991	·177	·093837	·227	·133946
·028	·006194	·078	·028356	·128	·058658	·178	·094601	·228	·134784
·029	·006527	·079	·028894	·129	·059328	·179	·095367	·229	·135624
·030	·006866	·080	·029435	·130	·059999	·180	·096135	·230	·136465
·031	·007209	·081	·029979	·131	·060673	·181	·096904	·231	·137307
·032	·007559	·082	·030526	·132	·061349	·182	·097675	·232	·138151
·033	·007913	·083	·031077	·133	·062027	·183	·098447	·233	·138996
·034	·008273	·084	·031630	·134	·062707	·184	·099221	·234	·139842
·035	·008638	·085	·032186	·135	·063389	·185	·099997	·235	·140689
·036	·009008	·086	·032746	·136	·064074	·186	·100774	·236	·141538
·037	·009383	·087	·033308	·137	·064761	·187	·101553	·237	·142388
·038	·009763	·088	·033873	·138	·065449	·188	·112334	·238	·143239
·039	·010148	·089	·034441	·139	·066140	·189	·103116	·239	·144091
·040	·010538	·090	·035012	·140	·066833	·190	·103900	·240	·144945
·041	·010932	·091	·035586	·141	·067528	·191	·104686	·241	·145800
·042	·011331	·092	·036162	·142	·068225	·192	·105472	·242	·146655
·043	·011734	·093	·036742	·143	·068924	·193	·106261	·243	·147513
·044	·012142	·094	·037324	·144	·069626	·194	·107051	·244	·138371
·045	·012555	·095	·037909	·145	·070329	·195	·107843	·245	·149231
·046	·012971	·096	·038497	·146	·071034	·196	·108636	·246	·150091
·047	·013393	·097	·039087	·147	·071741	·197	·109431	·247	·150953
·048	·013818	·098	·039681	·148	·072450	·198	·110227	·248	·151816
·049	·014248	·099	·040277	·149	·073162	·199	·111025	·249	·152681
·050	·014681	·100	·040875	·150	·073875	·200	·111824	·250	·153546

Height.	Area.	Height.	Area.	Height.	Area.	Height.	Area.	Height.	Area.
251	154413	301	199085	351	245935	401	294350	451	343778
252	155281	302	200003	352	246890	402	295330	452	344773
253	156149	303	200992	353	247845	403	296311	453	345768
254	157019	304	201841	354	248801	404	297292	454	346764
255	157891	305	202792	355	249758	405	298274	455	347760
256	158763	306	203683	356	250715	406	299256	456	348756
257	159636	307	204605	357	251673	407	300238	457	349752
258	160511	308	205528	358	252632	408	301221	458	350749
259	161386	309	206452	359	253591	409	302204	459	351745
260	162263	310	207376	360	254551	410	303187	460	352742
261	163141	311	208302	361	255511	411	304171	461	353739
262	164020	312	209228	362	256472	412	305156	462	354736
263	164900	313	210155	363	257433	413	306140	463	355733
264	165781	314	211083	364	258395	414	307125	464	356730
265	166663	315	212011	365	259358	415	308110	465	357728
266	167546	316	212941	366	260321	416	309096	466	358725
267	168431	317	213871	367	261285	417	310082	467	359723
268	169316	318	214802	368	262249	418	311068	468	360721
269	170202	319	215734	369	263214	419	312055	469	361719
270	171090	320	216666	370	264179	420	313042	470	362717
271	171978	321	217600	371	265145	421	314029	471	363715
272	172868	322	218534	372	266111	422	315017	472	364714
273	173758	323	219469	373	267078	423	316005	473	365712
274	174650	324	220404	374	268046	424	316993	474	366711
275	175542	325	221341	375	268014	425	317981	475	367710
276	176436	326	222278	376	269982	426	318970	476	368708
277	177330	327	223216	377	270951	427	319959	477	369707
278	178226	328	224154	378	271921	428	320949	478	370706
279	179122	329	225094	379	272891	429	321938	479	371705
280	180020	330	226034	380	273861	430	322928	480	372704
281	180918	331	226974	381	274832	431	323919	481	373704
282	181818	332	227916	382	275804	432	324909	482	374703
283	182718	333	228858	383	276776	433	325900	483	375702
284	183619	334	229801	384	277748	434	326891	484	376702
285	184522	335	230745	385	278721	435	327883	485	377701
286	185425	336	231689	386	279695	436	328874	486	378701
287	186329	337	232634	387	280669	437	329866	487	379701
288	187235	338	233580	388	281643	438	330858	488	380700
289	188141	339	234526	389	282618	439	331851	489	381700
290	189048	340	235473	390	283593	440	332843	490	382700
291	189956	341	236421	391	284569	441	333836	491	383700
292	190865	342	237369	392	285545	442	334829	492	384699
293	191774	343	238319	393	286521	443	335823	493	385699
294	192685	344	239268	394	287499	444	336816	494	386699
295	193597	345	240219	395	288476	445	337810	495	387699
296	194509	346	241170	396	289454	446	338804	496	388699
297	195423	347	242122	397	290432	447	339799	497	389699
298	196337	348	243074	398	291411	448	340793	498	390699
299	197252	349	244027	399	292390	449	341788	499	391699
300	198168	350	244980	400	293370	450	342783	500	392699

TABLE

OF

THE LENGTHS OF CIRCULAR ARCS WHOSE BASE IS UNITY.

Height of Arc.	Length of Arc.	Height of Arc.	Length of Arc.	Height of Arc.	Length of Arc.	Height of Arc.	Length of Arc.	Height of Arc.	Length of Arc.
101	1.02698	151	1.05973	201	1.10447	251	1.16033	301	1.22635
102	1.02752	152	1.06051	202	1.10548	252	1.16157	302	1.22776
103	1.02806	153	1.06130	203	1.10650	253	1.16279	303	1.22918
104	1.02860	154	1.06209	204	1.10752	254	1.16402	304	1.23061
105	1.02914	155	1.06288	205	1.10855	255	1.16526	305	1.23205
106	1.02970	156	1.06368	206	1.10958	256	1.16649	306	1.23349
107	1.03026	157	1.06449	207	1.11062	257	1.16774	307	1.23494
108	1.03082	158	1.06530	208	1.11165	258	1.16899	308	1.23636
109	1.03139	159	1.06611	209	1.11269	259	1.17024	309	1.27780
110	1.03196	160	1.06693	210	1.11374	260	1.17150	310	1.23925
111	1.03254	161	1.06775	211	1.11479	261	1.17275	311	1.24070
112	1.03312	162	1.06858	212	1.11584	262	1.17401	312	1.24216
113	1.03371	163	1.06941	213	1.11692	263	1.17527	313	1.24360
114	1.03430	164	1.07025	214	1.11796	264	1.17655	314	1.24506
115	1.03490	165	1.07109	215	1.11904	265	1.17784	315	1.24654
116	1.03551	166	1.07194	216	1.12011	266	1.17912	316	1.24801
117	1.03611	167	1.07279	217	1.12118	267	1.18040	317	1.24946
118	1.03672	168	1.07365	218	1.12225	268	1.18162	318	1.25095
119	1.03734	169	1.07451	219	1.12334	269	1.18294	319	1.25243
120	1.03797	170	1.07537	220	1.12445	270	1.18428	320	1.25391
121	1.03860	171	1.07624	221	1.12556	271	1.18557	321	1.25539
122	1.03923	172	1.07711	222	1.12663	272	1.18688	322	1.25686
123	1.03987	173	1.07799	223	1.12774	273	1.18819	323	1.25836
124	1.04051	174	1.07888	224	1.12885	274	1.18969	324	1.25987
125	1.04116	175	1.07977	225	1.12997	275	1.19082	325	1.26137
126	1.04181	176	1.08066	226	1.13108	276	1.19214	326	1.26286
127	1.04247	177	1.08156	227	1.13219	277	1.19345	327	1.26437
128	1.04313	178	1.08246	228	1.13331	278	1.19477	328	1.26588
129	1.04380	179	1.08337	229	1.13444	279	1.19610	329	1.26740
130	1.04447	180	1.08428	230	1.13557	280	1.19743	330	1.26892
131	1.04515	181	1.08519	231	1.13671	281	1.19887	331	1.27044
132	1.04584	182	1.08611	232	1.13786	282	1.20011	332	1.27196
133	1.04652	183	1.08704	233	1.13903	283	1.20146	333	1.27349
134	1.04722	184	1.08797	234	1.14020	284	1.20282	334	1.27502
135	1.04792	185	1.08890	235	1.14136	285	1.20419	335	1.27656
136	1.04862	186	1.08984	236	1.14247	286	1.20558	336	1.27810
137	1.04932	187	1.09079	237	1.14363	287	1.20696	337	1.27864
138	1.05003	188	1.09174	238	1.14480	288	1.20828	338	1.28118
139	1.05075	189	1.09269	239	1.14597	289	1.20967	339	1.28273
140	1.05147	190	1.09365	240	1.14714	290	1.21202	340	1.28428
141	1.05220	191	1.09461	241	1.14831	291	1.21239	341	1.28583
142	1.05293	192	1.09557	242	1.14949	292	1.21381	342	1.28739
143	1.05367	193	1.09654	243	1.15067	293	1.21520	343	1.28895
144	1.05441	194	1.09752	244	1.15186	294	1.21658	344	1.29052
145	1.05516	195	1.09850	245	1.15308	295	1.21794	345	1.29209
146	1.05591	196	1.09949	246	1.15429	296	1.21926	346	1.29366
147	1.05667	197	1.10048	247	1.15549	297	1.22061	347	1.29523
148	1.05743	198	1.10147	248	1.15670	298	1.22203	348	1.29681
149	1.05819	199	1.10247	249	1.15791	299	1.22347	349	1.29839
150	1.05896	200	1.10348	250	1.15912	300	1.22495	350	1.29997

Height of Arc.	Length of Arc.	Height of Arc.	Length of Arc.	Height of Arc.	Length of Arc.	Height of Arc.	Length of Arc.	Height of Arc.	Length of Arc.
351	1.30156	381	1.35068	411	1.40254	441	1.45697	471	1.51378
352	1.30315	382	1.35237	412	1.40432	442	1.45883	472	1.51571
353	1.30474	383	1.35406	413	1.40610	443	1.46069	473	1.51764
354	1.30634	384	1.35575	414	1.40788	444	1.46255	474	1.51958
355	1.30794	385	1.35744	415	1.40966	445	1.46441	475	1.52152
356	1.30954	386	1.35914	416	1.41145	446	1.46628	476	1.52346
357	1.31115	387	1.36084	417	1.41324	447	1.46815	477	1.52541
358	1.31276	388	1.36254	418	1.41503	448	1.47002	478	1.52736
359	1.31437	389	1.36425	419	1.41682	449	1.47189	479	1.52931
360	1.31599	390	1.36596	420	1.41861	450	1.47377	480	1.53126
361	1.31761	391	1.36767	421	1.42041	451	1.47565	481	1.53322
362	1.31923	392	1.36939	422	1.42222	452	1.47753	482	1.53518
363	1.32086	393	1.37111	423	1.42402	453	1.47942	483	1.53714
364	1.32249	394	1.37283	424	1.42583	454	1.48131	484	1.53910
365	1.32413	395	1.37455	425	1.42764	455	1.48320	485	1.54106
366	1.32577	396	1.37628	426	1.42945	456	1.48509	486	1.54302
367	1.32741	397	1.37801	427	1.43127	457	1.48699	487	1.54499
368	1.32905	398	1.37974	428	1.43309	458	1.48889	488	1.54696
369	1.33069	399	1.38148	429	1.43491	459	1.49079	489	1.54893
370	1.33234	400	1.38322	430	1.43673	460	1.49269	490	1.55098
371	1.33399	401	1.38496	431	1.43856	461	1.49460	491	1.55280
372	1.33564	402	1.38671	432	1.44039	462	1.49651	492	1.55486
373	1.33730	403	1.38846	433	1.44222	463	1.49842	493	1.55685
374	1.33896	404	1.39021	434	1.44405	464	1.50033	494	1.55884
375	1.34063	405	1.39196	435	1.44589	465	1.50224	495	1.56083
376	1.34229	406	1.39372	436	1.44773	466	1.50416	496	1.56282
377	1.34396	407	1.39548	437	1.44957	467	1.50608	497	1.56481
378	1.34563	408	1.39724	438	1.45142	468	1.50800	498	1.56680
379	1.34731	409	1.39900	439	1.45327	469	1.50992	499	1.56879
380	1.34899	410	1.40077	440	1.45512	470	1.51185	500	1.57079

To find the length of an arc of a circle by the table:

Rule. Divide the height by the base, and the quotient will be the height of an arc of which the base is unity. Multiply the tabular number opposite the corresponding quotient by the base of the arc, and the product equals the length of the curve required.

TABLE OF THE LENGTH OF CIRCULAR ARCS, RADIUS BEING UNITY.

Degree	Length.	Degree	Length.	Min.	Length.	Sec.	Length.
1	0.0174533	60	1.0471976	1	0.0002909	1	0.000048
2	0.0349066	70	1.2217305	2	0.0005818	2	0.000097
3	0.0523599	80	1.3962634	3	0.0008727	3	0.000145
4	0.0698132	90	1.5707963	4	0.0011636	4	0.000194
5	0.0872665	100	1.7453293	5	0.0014544	5	0.000242
6	0.1047198	120	2.0943951	6	0.0017453	6	0.000291
7	0.1221730	150	2.6179939	7	0.0020362	7	0.000339
8	0.1396263	180	3.1415927	8	0.0023271	8	0.000388
9	0.1570796	210	3.6651914	9	0.0026180	9	0.000436
10°	0.1745329	240	4.1887902	10	0.0029089	10	0.000485
20	0.3490659	270	4.7123890	20	0.0058178	20	0.000970
30	0.5235988	300	5.2359878	30	0.0087266	30	0.001454
40	0.6981317	330	5.7595865	40	0.0116355	40	0.001929
50	0.8726646	360	6.2831853	50	0.0145444	50	0.002424

Ex. Required the length of a circular arc of $37^{\circ} 42' 58''$?

$$30^{\circ} = 0.5235988$$

$$7^{\circ} = 0.1221730$$

$$40' = 0.0116355$$

$$2' = 0.0005818$$

$$50'' = 0.0002424$$

$$8'' = 0.0000388$$

The length 0.6582703 required in terms of the radius.

TABLE

OF

THE PROPORTIONS OF THE LENGTHS OF SEMI-ELLIPTIC ARCS.

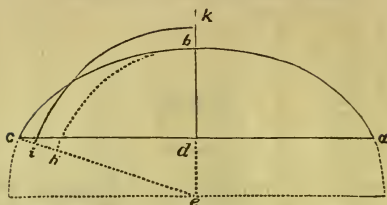
Height of Arc.	Length of Arc.	Height of Arc.	Length of Arc.	Height of Arc.	Length of Arc.	Height of Arc.	Length of Arc.	Height of Arc.	Length of Arc.
100	1.0416	265	1.2306	450	1.4931	635	1.7850	820	2.0971
101	1.0426	270	1.2371	455	1.5008	640	1.7931	825	2.1060
102	1.0436	275	1.2436	460	1.5084	645	1.8013	830	2.1148
103	1.0446	280	1.2501	465	1.5161	650	1.8094	835	2.1237
104	1.0456	285	1.2567	470	1.5238	655	1.8176	840	2.1326
105	1.0466	290	1.2634	475	1.5316	660	1.8258	845	2.1416
110	1.0516	295	1.2700	480	1.5394	665	1.8340	850	2.1505
115	1.0567	300	1.2767	485	1.5472	670	1.8423	855	2.1595
120	1.0618	305	1.2834	490	1.5550	675	1.8505	860	2.1685
125	1.0669	310	1.2901	495	1.5629	680	1.8587	865	2.1775
130	1.0720	315	1.2960	500	1.5709	685	1.8670	870	2.1866
135	1.0773	320	1.3038	505	1.5785	690	1.8753	875	2.1956
140	1.0825	325	1.3106	510	1.5863	695	1.8836	880	2.2047
145	1.0879	330	1.3175	515	1.5941	700	1.8919	885	2.2139
150	1.0933	335	1.3244	520	1.6019	705	1.9002	890	2.2230
155	1.0989	340	1.3313	525	1.6097	710	1.9085	895	2.2322
160	1.1045	345	1.3383	530	1.6175	715	1.9169	900	2.2414
165	1.1106	350	1.3454	535	1.6253	720	1.9253	905	2.2506
170	1.1157	355	1.3525	540	1.6331	725	1.9337	910	2.2597
175	1.1213	360	1.3597	545	1.6409	730	1.9422	915	2.2689
180	1.1270	365	1.3669	550	1.6488	735	1.9506	920	2.2780
185	1.1327	370	1.3741	555	1.6567	740	1.9599	925	2.2872
190	1.1384	375	1.3815	560	1.6646	745	1.9675	930	2.2964
195	1.1442	380	1.3888	565	1.6725	750	1.9760	935	2.3056
200	1.1501	385	1.3961	570	1.6804	755	1.9845	940	2.3148
205	1.1560	390	1.4034	575	1.6883	760	1.9931	945	2.3241
210	1.1620	395	1.4107	580	1.6963	765	2.0016	950	2.3335
215	1.1680	400	1.4180	585	1.7042	770	2.0102	955	2.3429
220	1.1741	405	1.4253	590	1.7123	775	2.0187	960	2.3524
225	1.1802	410	1.4327	595	1.7203	780	2.0273	965	2.3619
230	1.1864	415	1.4402	600	1.7283	785	2.0360	970	2.3714
235	1.1926	420	1.4476	605	1.7364	790	2.0446	975	2.3810
240	1.1989	425	1.4552	610	1.7444	795	2.0533	980	2.3906
245	1.2051	430	1.4627	615	1.7525	800	2.0620	985	2.4002
250	1.2114	435	1.4702	620	1.7606	805	2.0708	990	2.4098
255	1.2177	440	1.4778	625	1.7687	810	2.0795	995	2.4194
260	1.2241	445	1.4854	630	1.7768	815	2.0883	1000	2.4291

TO FIND THE LENGTH OF THE CURVE OF A RIGHT SEMI-ELLIPSE.—*Rule.*—The rule for circular arcs in the preceding table is equally applicable here.

The two last tables are not entirely confined to works which may be carried into practice, but are useful in estimating, to a very minute degree of accuracy, the quantity of work which is to be executed from drawings to a scale.

* As the tables, however, do not afford the means of finding the lengths of the curves of elliptic arcs, which are less than half of the entire figure, the following geometrical method is given to supply the defect.

TO FIND THE LENGTH OF AN ELLIPTIC CURVE, WHICH IS LESS THAN HALF THE FIGURE.—Let the curve, of which the length is required to be found, be $a b c$.



Produce the versed sine, bd , to meet the centre of the curve in e . Draw the right line, ce , and from the centre, e , with the distance, eb , describe an arc, bh . Bisect ch in i , and from the centre, e , with the radius, ei , describe the arc, ik , meeting eb produced to k ; then ik is half the arc abc .

NOTE.—When the quotient is not given in the column of heights, divide the difference between the two nearest heights by $\cdot 5$; multiply the quotient by the excess of the height given, and the height in the table first above it, and add this sum to the tabular area of the least height.

Thus, if the height is 118,

$\cdot 115$, per table, $= 1\cdot 0567$

$\cdot 120$ " " $= 1\cdot 0618$

$\cdot 0051 \div \cdot 5 = \cdot 0102 \times (118 - 115) = 00306$, which, added to $1\cdot 0567$, $= 1\cdot 05976$, the length for 118.

TABLE

OF

THE PROPORTIONS OF THE LENGTHS OF CIRCULAR ARCS

Whose Base is Unity.

Height of Arc.	Length of Arc.	Height of Arc.	Length of Arc.	Height of Arc.	Length of Arc.	Height of Arc.	Length of Arc.	Height of Arc.	Length of Arc.
$\cdot 100$	$1\cdot 0265$	$\cdot 130$	$1\cdot 0445$	$\cdot 160$	$1\cdot 0669$	$\cdot 190$	$1\cdot 0936$	$\cdot 220$	$1\cdot 1245$
$\cdot 101$	$1\cdot 0270$	$\cdot 131$	$1\cdot 0452$	$\cdot 161$	$1\cdot 0678$	$\cdot 191$	$1\cdot 0946$	$\cdot 221$	$1\cdot 1256$
$\cdot 102$	$1\cdot 0275$	$\cdot 132$	$1\cdot 0458$	$\cdot 162$	$1\cdot 0686$	$\cdot 192$	$1\cdot 0956$	$\cdot 222$	$1\cdot 1266$
$\cdot 103$	$1\cdot 0281$	$\cdot 133$	$1\cdot 0465$	$\cdot 163$	$1\cdot 0694$	$\cdot 193$	$1\cdot 0965$	$\cdot 223$	$1\cdot 1277$
$\cdot 104$	$1\cdot 0286$	$\cdot 134$	$1\cdot 0472$	$\cdot 164$	$1\cdot 0703$	$\cdot 194$	$1\cdot 0975$	$\cdot 224$	$1\cdot 1289$
$\cdot 105$	$1\cdot 0291$	$\cdot 135$	$1\cdot 0479$	$\cdot 165$	$1\cdot 0711$	$\cdot 195$	$1\cdot 0985$	$\cdot 225$	$1\cdot 1300$
$\cdot 106$	$1\cdot 0297$	$\cdot 136$	$1\cdot 0486$	$\cdot 166$	$1\cdot 0719$	$\cdot 196$	$1\cdot 0995$	$\cdot 226$	$1\cdot 1311$
$\cdot 107$	$1\cdot 0303$	$\cdot 137$	$1\cdot 0493$	$\cdot 167$	$1\cdot 0728$	$\cdot 197$	$1\cdot 1005$	$\cdot 227$	$1\cdot 1322$
$\cdot 108$	$1\cdot 0308$	$\cdot 138$	$1\cdot 0500$	$\cdot 168$	$1\cdot 0737$	$\cdot 198$	$1\cdot 1015$	$\cdot 228$	$1\cdot 1333$
$\cdot 109$	$1\cdot 0314$	$\cdot 139$	$1\cdot 0508$	$\cdot 169$	$1\cdot 0745$	$\cdot 199$	$1\cdot 1025$	$\cdot 229$	$1\cdot 1344$
$\cdot 110$	$1\cdot 0320$	$\cdot 140$	$1\cdot 0515$	$\cdot 170$	$1\cdot 0754$	$\cdot 200$	$1\cdot 1035$	$\cdot 230$	$1\cdot 1356$
$\cdot 111$	$1\cdot 0325$	$\cdot 141$	$1\cdot 0522$	$\cdot 171$	$1\cdot 0762$	$\cdot 201$	$1\cdot 1045$	$\cdot 231$	$1\cdot 1367$
$\cdot 112$	$1\cdot 0331$	$\cdot 142$	$1\cdot 0529$	$\cdot 172$	$1\cdot 0771$	$\cdot 202$	$1\cdot 1055$	$\cdot 232$	$1\cdot 1379$
$\cdot 113$	$1\cdot 0337$	$\cdot 143$	$1\cdot 0537$	$\cdot 173$	$1\cdot 0780$	$\cdot 203$	$1\cdot 1065$	$\cdot 233$	$1\cdot 1390$
$\cdot 114$	$1\cdot 0343$	$\cdot 144$	$1\cdot 0544$	$\cdot 174$	$1\cdot 0789$	$\cdot 204$	$1\cdot 1075$	$\cdot 234$	$1\cdot 1402$
$\cdot 115$	$1\cdot 0349$	$\cdot 145$	$1\cdot 0552$	$\cdot 175$	$1\cdot 0798$	$\cdot 205$	$1\cdot 1085$	$\cdot 235$	$1\cdot 1414$
$\cdot 116$	$1\cdot 0355$	$\cdot 146$	$1\cdot 0559$	$\cdot 176$	$1\cdot 0807$	$\cdot 206$	$1\cdot 1096$	$\cdot 236$	$1\cdot 1425$
$\cdot 117$	$1\cdot 0361$	$\cdot 147$	$1\cdot 0567$	$\cdot 177$	$1\cdot 0816$	$\cdot 207$	$1\cdot 1106$	$\cdot 237$	$1\cdot 1436$
$\cdot 118$	$1\cdot 0367$	$\cdot 148$	$1\cdot 0574$	$\cdot 178$	$1\cdot 0825$	$\cdot 208$	$1\cdot 1117$	$\cdot 238$	$1\cdot 1448$
$\cdot 119$	$1\cdot 0373$	$\cdot 149$	$1\cdot 0582$	$\cdot 179$	$1\cdot 0834$	$\cdot 209$	$1\cdot 1127$	$\cdot 239$	$1\cdot 1460$
$\cdot 120$	$1\cdot 0380$	$\cdot 150$	$1\cdot 0590$	$\cdot 180$	$1\cdot 0843$	$\cdot 210$	$1\cdot 1137$	$\cdot 240$	$1\cdot 1471$
$\cdot 121$	$1\cdot 0386$	$\cdot 151$	$1\cdot 0597$	$\cdot 181$	$1\cdot 0852$	$\cdot 211$	$1\cdot 1148$	$\cdot 241$	$1\cdot 1483$
$\cdot 122$	$1\cdot 0392$	$\cdot 152$	$1\cdot 0605$	$\cdot 182$	$1\cdot 0861$	$\cdot 212$	$1\cdot 1158$	$\cdot 242$	$1\cdot 1495$
$\cdot 123$	$1\cdot 0399$	$\cdot 153$	$1\cdot 0613$	$\cdot 183$	$1\cdot 0870$	$\cdot 213$	$1\cdot 1169$	$\cdot 243$	$1\cdot 1507$
$\cdot 124$	$1\cdot 0405$	$\cdot 154$	$1\cdot 0621$	$\cdot 184$	$1\cdot 0880$	$\cdot 214$	$1\cdot 1180$	$\cdot 244$	$1\cdot 1519$
$\cdot 125$	$1\cdot 0412$	$\cdot 155$	$1\cdot 0629$	$\cdot 185$	$1\cdot 0889$	$\cdot 215$	$1\cdot 1190$	$\cdot 245$	$1\cdot 1531$
$\cdot 126$	$1\cdot 0418$	$\cdot 156$	$1\cdot 0637$	$\cdot 186$	$1\cdot 0898$	$\cdot 216$	$1\cdot 1201$	$\cdot 246$	$1\cdot 1543$
$\cdot 127$	$1\cdot 0425$	$\cdot 157$	$1\cdot 0645$	$\cdot 187$	$1\cdot 0908$	$\cdot 217$	$1\cdot 1212$	$\cdot 247$	$1\cdot 1555$
$\cdot 128$	$1\cdot 0431$	$\cdot 158$	$1\cdot 0653$	$\cdot 188$	$1\cdot 0917$	$\cdot 218$	$1\cdot 1223$	$\cdot 248$	$1\cdot 1567$
$\cdot 129$	$1\cdot 0438$	$\cdot 159$	$1\cdot 0661$	$\cdot 189$	$1\cdot 0927$	$\cdot 219$	$1\cdot 1233$	$\cdot 249$	$1\cdot 1579$

Height of Arc.	Length of Arc.	Height of Arc.	Length of Arc.	Height of Arc.	Length of Arc.	Height of Arc.	Length of Arc.	Height of Arc.	Length of Arc.
250	1.1591	300	1.2250	350	1.3000	400	1.3832	450	1.4738
251	1.1603	301	1.2264	351	1.3016	401	1.3850	451	1.4757
252	1.1616	302	1.2278	352	1.3032	402	1.3867	452	1.4775
253	1.1628	303	1.2292	353	1.3047	403	1.3885	453	1.4794
254	1.1640	304	1.2306	354	1.3063	404	1.3902	454	1.4813
255	1.1653	305	1.2321	355	1.3079	405	1.3920	455	1.4832
256	1.1665	306	1.2335	356	1.3095	406	1.3937	456	1.4851
257	1.1677	307	1.2349	357	1.3112	407	1.3955	457	1.4870
258	1.1690	308	1.2364	358	1.3128	408	1.3972	458	1.4889
259	1.1702	309	1.2378	359	1.3144	409	1.3990	459	1.4908
260	1.1715	310	1.2393	360	1.3160	410	1.4008	460	1.4927
261	1.1728	311	1.2407	361	1.3176	411	1.4025	461	1.4946
262	1.1740	312	1.2422	362	1.3192	412	1.4043	462	1.4965
263	1.1753	313	1.2436	363	1.3209	413	1.4061	463	1.4984
264	1.1766	314	1.2451	364	1.3225	414	1.4079	464	1.5003
265	1.1778	315	1.2465	365	1.3241	415	1.4097	465	1.5022
266	1.1791	316	1.2480	366	1.3258	416	1.4115	466	1.5042
267	1.1804	317	1.2495	367	1.3274	417	1.4132	467	1.5061
268	1.1816	318	1.2510	368	1.3291	418	1.4150	468	1.5080
269	1.1829	319	1.2524	369	1.3307	419	1.4168	469	1.5099
270	1.1843	320	1.2539	370	1.3323	420	1.4186	470	1.5119
271	1.1856	321	1.2554	371	1.3340	421	1.4204	471	1.5138
272	1.1869	322	1.2569	372	1.3356	422	1.4222	472	1.5157
273	1.1882	323	1.2584	373	1.3373	423	1.4240	473	1.5176
274	1.1897	324	1.2599	374	1.3390	424	1.4258	474	1.5196
275	1.1908	325	1.2614	375	1.3406	425	1.4276	475	1.5215
276	1.1921	326	1.2629	376	1.3423	426	1.4295	476	1.5235
277	1.1934	327	1.2644	377	1.3440	427	1.4313	477	1.5254
278	1.1948	328	1.2659	378	1.3456	428	1.4331	478	1.5274
279	1.1961	329	1.2674	379	1.3473	429	1.4349	479	1.5293
280	1.1974	330	1.2689	380	1.3490	430	1.4367	480	1.5313
281	1.1989	331	1.2704	381	1.3507	431	1.4386	481	1.5332
282	1.2001	332	1.2720	382	1.3524	432	1.4404	482	1.5352
283	1.2015	333	1.2735	383	1.3541	433	1.4422	483	1.5371
284	1.2028	334	1.2750	384	1.3558	434	1.4441	484	1.5391
285	1.2042	335	1.2766	385	1.3574	435	1.4459	485	1.5411
286	1.2056	336	1.2781	386	1.3591	436	1.4477	486	1.5430
287	1.2070	337	1.2796	387	1.3608	437	1.4496	487	1.5450
288	1.2083	338	1.2812	388	1.3625	438	1.4514	488	1.5470
289	1.2097	339	1.2827	389	1.3643	439	1.4533	489	1.5489
290	1.2120	340	1.2843	390	1.3660	440	1.4551	490	1.5509
291	1.2124	341	1.2858	391	1.3677	441	1.4570	491	1.5529
292	1.2138	342	1.2874	392	1.3694	442	1.4588	492	1.5549
293	1.2152	343	1.2890	393	1.3711	443	1.4607	493	1.5569
294	1.2166	344	1.2905	394	1.3728	444	1.4626	494	1.5585
295	1.2179	345	1.2921	395	1.3746	445	1.4644	495	1.5608
296	1.2193	346	1.2937	396	1.3763	446	1.4663	496	1.5628
297	1.2206	347	1.2952	397	1.3780	447	1.4682	497	1.5648
298	1.2220	348	1.2968	398	1.3797	448	1.4700	498	1.5668
299	1.2235	349	1.2984	399	1.3815	449	1.4719	499	1.5688

TO FIND THE LENGTH OF AN ARC OF A CIRCLE BY THE FOREGOING TABLE.—

Rule.—Divide the height by the base, and the quotient will be the height of an arc, of which the base is unity. Seek in the table for a number corresponding to the quotient, and take the length of that height from the next right-hand column. Multiply the number, thus found, by the base of the arc, and the product will be the length of the arc or curve required.

Example.—The profiles of the intradoses of the arches of a bridge are each a semi-ellipse; the span of the middle arch is 150 feet, and the height 38 feet: required the length of the curve.

$$38 \div 150 = .253, \text{ and } .253, \text{ as per table, } = 1.2628.$$

Hence, $12628 \times 150 = 174.4200$, the length required.

DEMONSTRATION OF THE PRISMOIDAL FORMULA,

BY WHICH

THE FOLLOWING SERIES OF TABLES WERE CALCULATED.

LET ABCGFKDE (Fig. 1) represent a prismoid or solid figure, similar to that which is formed in excavations or embankments, in which BCDK represents the road-way, and ABCG, FKDE parallel cross sections at each end. The cubic content of this solid is equal to the areas of each end, added to 4 times the mean area, and the sum multiplied by the length of the prismoid divided by 6.

That is, to the area ABCG + area FKDE + 4 times the area $a b c g$, multiplied by $\frac{CD}{6}$:

Bisect the breadth of the road-way KD in the point O; from the point O raise the perpendicular ON, which will represent the depth of cutting at the lower end of the section; in the same manner bisect BC, in the point M, and raise the perpendicular ML, which will represent the depth of cutting at the upper end of the section; on this perpendicular lay off from the point M, a distance MQ, equal to ON, the perpendicular height of the lower end of the section; through the point Q, draw the line HI parallel to BC, this line HI will be equal to the line FE, as the planes are parallel, and the angles of the slopes ABC, BCG are supposed to be equal to the angles FKD, KDE. If, then, we suppose a plane HIEF to be drawn through the lines HI and EF, it will be parallel to the base BCKD, and will divide the solid ABCGFKDE into two others, one of which will be the regular prism HBCIFKDE, and the other will be a wedge, the base of which will be the trapezium AHIG, the length IE or CD the length of the prismoid, and the edge FE the breadth of the cutting at the lower end of the section.

This wedge may be divided by the vertical plane AHE into the two pyramids AHIGE and AHEF, the base of the first being the trapezium AHIG, and its height the line IE or CD, the length of the prism. The base of the other is the triangle FEH, and its height a perpendicular AR let fall from the vertex A to the plane HIEF.

The solid content of the prismoid will therefore be equal to the content of the regular prism HBCIFKDE, and the two pyramids AHIGE and AHEF.

Let $BC = b$, the breadth at the bottom of the cutting.

$ML = h$, the perpendicular depth of cutting at the higher end.

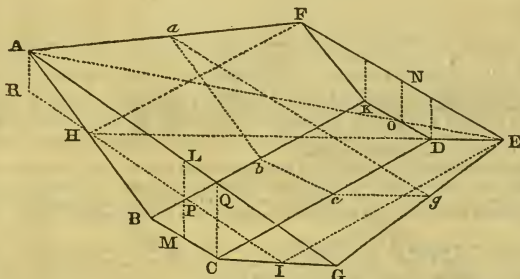
ON or $MQ = h'$, the perpendicular depth of cutting at the lower end.

$CD = l$, the length of the solid.

$PI = rh'$, the ratio of the perpendicular height of the slope to its horizontal base, multiplied by the height MQ or ON .

Then the content of the prism HBCIFKDE will be equal to the area of the end FKDE or HBCI, multiplied by CD; or to $BC + PI \times MQ \times CD = \overline{b + h} r \times h' \times l$. The content of the pyramid AHIGE is equal to the area of its base AHIG, multiplied by $\frac{1}{3}$ its height IE; or to $[(b + rh)h - (b + rh')h'] \frac{l}{3}$ for the area of AHIG is equal to the difference of the areas of the ends ABCG and FKDE. And the content of the pyramid AHEF is equal to the area of the triangle HEF, $\times \frac{1}{2}$ AR, or to $\frac{1}{2} EF \times HF \times \frac{1}{2} AR = \frac{b + 2rh'}{2} \times l \times \frac{h-h'}{3}$ for $AR = LQ = h - h'$.

PRISMOIDAL DIAGRAM.



The content of the prismoid ABCGFKDE, as seen in the above diagram, will therefore equal the sum of these three quantities; that is,

$$\begin{aligned}
 &= (b + rh') h' \times l + [(b + rh) h - (b + rh') h'] \frac{l}{3} + \frac{b + 2rh'}{2} \times l \times \frac{h - h'}{3} \\
 &= [3(b + rh') h' + (b + rh) h - (b + rh') h' + \frac{b + 2rh'}{2} (h - h')] \frac{l}{3} \\
 &= [2(b + rh') h' + (b + rh) h + \frac{b + 2rh'}{2} (h - h')] \frac{l}{3} \\
 &= [4(b + rh') h' + 2(b + rh) h + (b + 2rh') (h - h')] \frac{l}{6} \\
 &= [4bh' + 4rh'\frac{2}{3} + 2bh + 2rh\frac{2}{3} + bh + 2rhh' - hh' - 2rh'\frac{2}{3}] \frac{l}{6} \\
 &= [3bh' + 2rh'\frac{2}{3} + 2bh + 2rh\frac{2}{3} + 2rhh'] \frac{l}{6} \\
 &= [2bh' + bh' + rh'\frac{2}{3} + rh'\frac{2}{3} + 2bh + bh + rh\frac{2}{3} + rh\frac{2}{3} + 2rhh'] \frac{l}{6} \\
 &= [(b + rh') h' + (b + rh) h + 2bh + 2bh' + rh'\frac{2}{3} + rh\frac{2}{3} + 2rhh'] \frac{l}{6} \\
 &= [(b + rh') h' + (b + rh) h + 4[b + r \frac{h + h'}{2}] \frac{h - h'}{2}] \frac{l}{6}
 \end{aligned}$$

= area of each end, added to four times the middle area, and the sum multiplied by the length divided by 6.

EXPLANATION

OF

THE SERIES OF EXCAVATION TABLES

EVERY practical Engineer is well aware, by experience, of the inconvenience which arises from the length of time necessary for calculating the cubic quantity of earth-work in the cuttings and embankments of railroads, &c.; especially where the section is of considerable extent and the surface of the ground uneven. Frequently, calculations of this kind are required of the engineer on a short notice, and to be furnished within a limited period. The consequence is, that errors are almost sure to occur, by reason of the multiplicity of figures necessary to complete the task, though the calculations themselves are perfectly simple.

The following series of tables have been constructed with the view of saving time in making these calculations, and insuring accuracy in the results. Besides these advantages, they may serve another purpose, viz: that of satisfying CONTRACTORS that the estimates of their respective engineers correspond with authentic tables.

The FIRST SERIES of Tables exhibit the number of cubic yards contained in any cutting or embankment for *one chain in length*, the bases varying from 27 to 36 feet; the sides of slopes being 1 to 1, $1\frac{1}{2}$ to 1, and 2 to 1.

The depths of cuttings will be found in the *first* and *eighth* column of the tables, in feet and quarters of a foot, and the number of cubic yards of earth in the several cuttings or embankments will be found directly at the right of the depth of the cutting, and under the width of the base corresponding to said cutting.

The *seventh* and *last* column in each table, headed "One perpendicular foot in height," exhibits the number of cubic yards contained in *one chain in length* and one perpendicular foot in breadth.

Should, therefore, any excavation or embankment be either less or more than the base or road-bed in the tables, the cubic contents may be readily found by adding to or subtracting from the quantity set opposite the table-breadths the quantity in the seventh or last columns for every foot in breadth it may differ from the table-breadths. Thus, to find the cubic content of a chain in length, of cutting 20 feet 3 inches deep, side of slopes $1\frac{1}{2}$ to 1, and breadth of base or road-bed 25 feet:

By the table, 24 feet in breadth contains . . . 2692 cubic yards.

And 1 foot in breadth contains . . . +49'50 "

2741'50 "

In this series of Tables, the fractional part of a cubic yard has been omitted (except in the column of contents for one perpendicular foot in breadth) when less than one-half a cubic yard; but when it exceeded one-half, one cubic yard has been added. This is sufficiently near for all practical purposes.

The SECOND SERIES of Tables are calculated for sides of slopes $1\frac{1}{2}$ to 1, breadth of bases 15, 20, 24 and 25 feet: The lengths of chains computed from are, in the first table, 100 feet; in the second, 66 feet; in the third, 132 feet, or 2 chains of 66 feet; in the fourth, 66 feet; and in the fifth, 100 feet. The depth of cuttings varies by one-tenth of a foot, and extends to all depths or heights of cuttings and embankments usual in practice.

The number of cubic yards contained in any cutting or embankment will be found directly at the right of the depth of cutting or height of embankment. Thus: Required the number of cubic yards in a cutting 22'4 feet deep, base 25 feet, length of chain 100 feet, and side of slopes $1\frac{1}{2}$ to 1. By the table, at one view, the amount is seen to be 4861'8 cubic yards.

Should any base or road-bed exceed the bases given in the tables, the contents may be readily computed by first using the tables for their extent, and then computing the cubical contents for a section of one or more feet, taken from the middle, and of the same length of chain.

Thus, were the above example 26 feet base: Then the table shows 25 feet to make 4861.8 cubic feet.

And 1 perpendicular foot in breadth, 8.3 "

 4860.1 "

The above grades of slopes are most usual in practice, as are also the bases, and by reason of the minute variations in depth or height, will be found exceedingly useful and convenient.

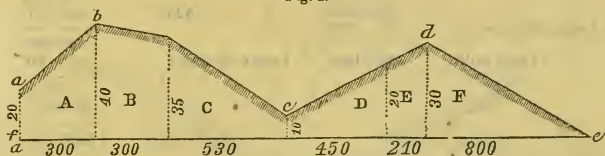
The THIRD SERIES of Tables, varying in depth from 1 to 50 feet in the side vertical columns, and from 25 to 35 in the horizontal columns, are calculated to sides of slopes 1 to 1, $1\frac{1}{2}$ to 1, and 2 to 1, and base 1; as seen in the following

EXAMPLE.

Let $abcde$ (Fig. 1) represent the surface of the ground over which a proposed railroad is to be constructed, and the line ae the level of the bottom of the cutting:

LONGITUDINAL SECTION OF A RAILROAD.

Fig. 1.



and let the cross section of the road be represented by Fig. 2:

CROSS SECTION AT b .

Fig. 2.



The number of cubic yards of earth in this section will be found by the THIRD SERIES of Tables, corresponding to the grade of slopes in this section, which is $1\frac{1}{2}$ to 1. Thus: look for the first height (20) in the horizontal columns at the top or bottom of the page, and for the second height (40) in the vertical columns at either side of the page. At the intersection of these lines will be found the number 1.1111, and in the column of additions the number 51.852. Set these numbers down, and multiply the given base by the multiplier, and to the product add the number taken from the addition column, the sum will be the mean area, which is to be multiplied by the length of the section for the content in cubic yards.

Proceed in the same manner for the other portions of the section, marked BCDEF, and arrange the work as in the following example.

Should the longitudinal section be laid down by a scale of links, instead of feet, the result given by the tables should be multiplied by the decimal .66, in order to get the true content.

BY THE TABLES.

Section A.

Table multiplier	= 1.1111
Base	= 30
	<hr/>
	33.3330
Add	= 51.852
	<hr/>
	85.1850
Length of section	= 300
	<hr/>
Cubic yards	25555.5000

Section B.

Table multiplier	= 1.3889
Base	= 30
	<hr/>
	41.6670
Add	= 78.241
	<hr/>
	119.9080
Length of section	= 300
	<hr/>
Cubic yards	35972.4000

Section C.

Table multiplier	= .8333
Base	= 30
	<hr/>
	24.9990
Add	= 31.019
	<hr/>
	56.0180
Length of section	= 530
	<hr/>
	16805.400
	2800900
	<hr/>
Cubic yards	29689.5400

Section D.

Table multiplier	= .5556
Base	= 30
	<hr/>
	16.6680
Add	= 12.963
	<hr/>
	29.6310
Length of section	= 450
	<hr/>
	14815500
	1185240
	<hr/>
Cubic yards	13333.9500

Section E.

Table multiplier	= .9259
Base	= 30
	<hr/>
	27.7770
Add	= 35.185
	<hr/>
	62.9620
Length of section	= 210
	<hr/>
	6296200
	1259240
	<hr/>
Cubic yards	13222.0200

Section F.

Table multiplier	= .5556
Base	= 30
	<hr/>
	16.6680
Add	= 16.667
	<hr/>
	33.3350
Length of section	= 800
	<hr/>
Cubic yards	26668.0000

These products, collected, will be as follows:

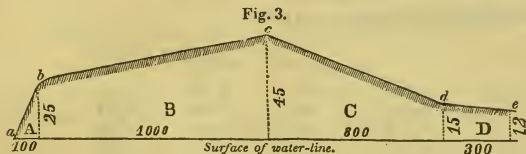
A = 25,555.50
B = 35,972.40
C = 29,689.54
D = 13,333.95
E = 13,222.02
F = 26,668.00

The sum of which is 144,441.41 = the true quantity in cubic yards

EXAMPLE II.

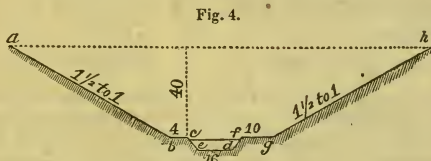
Let $abcde$ (Fig. 3) represent the ground-line or longitudinal section of part of a canal, as seen in the figure below :

SECTION OF A CANAL.



and $abcdefgh$ (Fig. 4) a cross section of the same canal at c . The dimensions of the canal, below the level of the towing-path, are supposed to be uniform, and as follows: Width at the bottom of the canal, 16 feet; the slopes 1 to 1, and depth (from the level of the towing-path to the bottom of the canal) 6 feet; and the whole length of the section 2200 feet.

CROSS SECTION OF THE CANAL AT C.



Examine the third series of tables, and find the table corresponding to the given slopes, which in this case is $1\frac{1}{2}$ to 1; look along the upper line of the page for the given depth below the level of the towing-path, which in this example is 6 feet; next look along either of the side vertical columns for the same depth, 6 feet; at the intersection of these lines, there will be found in the column of multipliers the number .2222, and in the column of additions the number 1.333. Set these numbers down, and multiply the given base by the multiplier, and to the product add the number taken from the addition column; the sum will be the mean area, which is to be multiplied by the length of the section for the content in cubic yards.

Thus: Table multiplier = .2222
Base = 16

13332
2222

3.5552
Add . . . = 1.333

4.8882
Length of section = 2200

9776400
97764

Cubic yards . . = 10,754.0400
16

As the width at the bottom of the canal is 16 feet, the slopes 1 to 1, and the depth 6 feet, the width from bank to bank, at the level of the towing-path, or from *e* to *f*, will be 28 feet, and the whole width of cutting, at the same level, from *b* to *g*, will be 42 feet.

Observing now that the depths of cuttings marked on the vertical lines *a b c d e* of *Fig. 3*, are supposed to be to the surface of the water, which is 1 foot below the towing-path; it will therefore be necessary to subtract 1 foot from each of these heights in looking for the tabular number.

The calculations will therefore be as follows:

				TABULAR NUMBER.	
Heights.				Mult.	Add.
A =	3	.	.	0.5000	12.167
B =	24	.	.	1.2593	66.074
C =	44	.	.	1.0741	50.889
D =	14	.	.	0.4630	8.722

Mult.	Base.	Add.	Length.	Cubic yards.
0.5000	×	42	+	12.167
1.2593	×	42	+	66.074
1.0741	×	42	+	50.889
0.4630	×	42	+	8.722

Cubic content above the level of the towing-path = 207,532.66

Cubic content below the level of the towing-path,
as before found, 10,754.04

Total content of section = 218,286.70

Observe.—Should the depth of cutting on one side of the section exceed the numbers at the top or bottom of the page, but not on the other, the highest number must in that case be sought for in either of the side *vertical* columns, and the lowest at the top or bottom of the page. Thus, 44 feet in the vertical column, and 14 feet in the horizontal, gives the same result as 14 feet in the horizontal and 44 feet in the vertical. Should the depth of cutting exceed 50 feet the first series of tables must be used.

TABLES

OF
EXCAVATION AND EMBANKMENT.

TABLE I.—FIRST SERIES.

Side of Slopes, 1 Horizontal, to each Perpendicular Foot.

66 FEET CHAIN.

Depth of cut- ting.	BREADTH OF BASE.					One perpend. foot in breadth.	Depth of cut- ting.	BREADTH OF BASE.					One perpend. foot in breadth.
	24 ft.	27 ft.	30 ft.	33 ft.	36 ft.			24 ft.	27 ft.	30 ft.	33 ft.	36 ft.	
ft. in.	cu. y.	cu. y.	cu. y.	cu. y.	cu. y.	cu. yds.	ft. in.	cu. y.	cu. y.	cu. y.	cu. y.	cu. y.	cu. yds.
1 0	61	68	76	83	90	2.44	11 0	941	1022	1102	1183	1264	26.89
1 3	77	86	96	105	114	3.06	11 3	969	1052	1134	1217	1299	27.50
1 6	94	105	116	127	138	3.67	11 6	998	1082	1167	1251	1335	28.11
1 9	110	123	136	149	162	4.28	11 9	1027	1113	1199	1285	1371	28.72
2 0	127	142	156	171	186	4.89	12 0	1056	1144	1232	1320	1408	29.33
2 3	144	161	177	194	210	5.50	12 3	1086	1175	1265	1355	1445	29.94
2 6	162	180	199	217	235	6.11	12 6	1115	1207	1299	1390	1482	30.55
2 9	180	200	220	240	260	6.72	12 9	1145	1239	1332	1426	1519	31.17
3 0	198	220	242	264	286	7.33	13 0	1176	1271	1366	1462	1557	31.78
3 3	217	240	264	288	312	7.94	13 3	1206	1304	1401	1498	1595	32.39
3 6	235	261	287	312	338	8.55	13 6	1238	1337	1436	1535	1634	33.
3 9	254	282	309	337	364	9.17	13 9	1269	1370	1470	1571	1672	33.61
4 0	274	303	332	362	391	9.78	14 0	1300	1403	1506	1608	1711	34.22
4 3	293	325	356	387	418	10.39	14 3	1332	1437	1541	1646	1750	34.83
4 6	314	347	380	413	446	11.	14 6	1365	1471	1577	1684	1790	35.44
4 9	334	369	403	438	473	11.61	14 9	1397	1505	1614	1722	1830	36.06
5 0	354	391	428	464	501	12.22	15 0	1430	1540	1650	1760	1870	36.67
5 3	375	414	452	491	529	12.83	15 3	1463	1575	1687	1799	1911	37.28
5 6	397	437	477	518	558	13.44	15 6	1497	1610	1724	1838	1951	37.89
5 9	418	460	503	545	587	14.06	15 9	1530	1646	1761	1877	1992	38.50
6 0	440	484	528	572	616	14.67	16 0	1564	1682	1799	1916	2034	39.11
6 3	462	508	554	600	646	15.28	16 3	1599	1718	1837	1956	2075	39.72
6 6	485	532	580	628	675	15.89	16 6	1634	1755	1876	1997	2118	40.33
6 9	507	557	606	656	705	16.50	16 9	1669	1791	1914	2037	2160	40.94
7 0	530	582	633	684	736	17.11	17 0	1704	1828	1953	2078	2202	41.55
7 3	554	607	660	713	766	17.72	17 3	1739	1866	1992	2119	2245	42.17
7 6	578	633	688	743	798	18.33	17 6	1775	1904	2032	2160	2289	42.78
7 9	602	658	715	772	829	18.94	17 9	1811	1942	2072	2202	2332	43.39
8 0	626	684	743	802	860	19.55	18 0	1848	1980	2112	2244	2376	44.
8 3	650	711	771	832	892	20.17	18 3	1885	2019	2152	2286	2420	44.61
8 6	675	738	800	862	925	20.78	18 6	1922	2058	2193	2329	2465	45.22
8 9	700	765	829	893	957	21.39	18 9	1959	2097	2234	2372	2509	45.83
9 0	726	792	858	924	990	22.	19 0	1997	2136	2276	2415	2554	46.44
9 3	752	820	887	955	1023	22.61	19 3	2035	2176	2318	2459	2600	47.06
9 6	778	848	917	987	1057	23.22	19 6	2074	2217	2360	2503	2646	47.67
9 9	804	876	947	1019	1090	23.83	19 9	2112	2257	2402	2547	2692	48.28
10 0	831	904	978	1051	1124	24.44	20 0	2151	2398	2444	2591	2738	48.89
10 3	858	933	1009	1084	1159	25.06	20 3	2190	2339	2487	2636	2784	49.50
10 6	886	963	1040	1117	1194	25.67	20 6	2230	2380	2531	2681	2831	50.11
10 9	913	992	1071	1150	1229	26.28	20 9	2270	2422	2574	2726	2878	50.72

EXCAVATION AND EMBANKMENT.

TABLE II.—FIRST SERIES.

Side of Slopes, 1½ Horizontal, to each Perpendicular Foot.

66 FEET CHAIN.

Depth of cut- ting.	BREADTH OF BASE.					One perpend. foot in breadth.	Depth of cut- ting.	BREADTH OF BASE.					One perpend. foot in breadth.
	24 ft.	27 ft.	30 ft.	33 ft.	36 ft.			24 ft.	27 ft.	30 ft.	33 ft.	36 ft.	
ft. in.	cu. y.	cu. y.	cu. y.	cu. y.	cu. y.	cu. yds.	ft. in.	cu. y.	cu. y.	cu. y.	cu. y.	cu. y.	cu. yds.
1 0	62	70	77	84	92	2.44	11 0	1089	1170	1250	1331	1412	26.89
1 3	79	88	97	107	116	3.06	11 3	1124	1207	1289	1372	1454	27.50
1 6	96	107	118	129	140	3.67	11 6	1160	1244	1328	1413	1497	28.11
1 9	114	127	140	152	165	4.28	11 9	1196	1282	1368	1454	1540	28.72
2 0	132	147	161	176	191	4.89	12 0	1232	1320	1408	1496	1584	29.33
2 3	151	167	184	200	217	5.50	12 3	1269	1359	1449	1538	1628	29.94
2 6	170	188	206	225	243	6.11	12 6	1306	1398	1490	1581	1673	30.55
2 9	189	209	229	250	270	6.72	12 9	1344	1438	1531	1625	1718	31.17
3 0	209	231	253	275	297	7.33	13 0	1382	1478	1573	1668	1764	31.78
3 3	229	253	277	301	325	7.94	13 3	1421	1518	1615	1713	1810	32.39
3 6	250	276	302	327	353	8.55	13 6	1460	1559	1658	1757	1856	33.
3 9	272	299	327	354	382	9.17	13 9	1500	1601	1702	1802	1903	33.61
4 0	293	323	352	381	411	9.78	14 0	1540	1643	1745	1848	1951	34.22
4 3	316	347	378	409	440	10.39	14 3	1581	1685	1790	1894	1999	34.83
4 6	338	371	404	437	470	11.	14 6	1622	1728	1834	1941	2047	35.44
4 9	361	396	431	466	501	11.61	14 9	1663	1771	1879	1988	2096	36.06
5 0	385	422	458	495	532	12.22	15 0	1705	1815	1925	2035	2145	36.67
5 3	409	448	486	525	563	12.83	15 3	1747	1859	1971	2083	2195	37.28
5 6	434	474	514	555	595	13.44	15 6	1790	1904	2018	2131	2245	37.89
5 9	459	501	543	585	627	14.06	15 9	1834	1949	2065	2180	2296	38.50
6 0	484	528	572	616	660	14.67	16 0	1877	1995	2112	2229	2347	39.11
6 3	510	556	602	647	693	15.28	16 3	1922	2041	2160	2279	2398	39.72
6 6	536	584	632	679	727	15.89	16 6	1966	2087	2208	2329	2450	40.33
6 9	563	613	662	712	761	16.50	16 9	2011	2134	2257	2380	2503	40.94
7 0	590	642	693	744	796	17.11	17 0	2057	2182	2306	2431	2556	41.55
7 3	618	671	724	778	831	17.72	17 3	2103	2230	2356	2483	2609	42.17
7 6	646	701	756	811	866	18.33	17 6	2150	2278	2406	2535	2663	42.78
7 9	675	732	789	845	902	18.94	17 9	2197	2327	2457	2587	2717	43.39
8 0	704	763	821	880	939	19.55	18 0	2244	2376	2508	2640	2772	44.
8 3	734	794	855	915	976	20.17	18 3	2292	2426	2560	2693	2827	44.61
8 6	764	826	888	951	1013	20.78	18 6	2340	2476	2612	2747	2883	45.22
8 9	794	858	922	987	1051	21.39	18 9	2389	2527	2664	2802	2939	45.83
9 0	825	891	957	1023	1089	22.	19 0	2438	2578	2717	2856	2996	46.44
9 3	856	924	992	1060	1128	22.61	19 3	2488	2629	2770	2912	3053	47.06
9 6	888	958	1028	1097	1167	23.22	19 6	2538	2681	2824	2967	3110	47.67
9 9	921	992	1064	1135	1207	23.83	19 9	2589	2734	2879	3023	3168	48.28
10 0	953	1027	1100	1173	1247	24.44	20 0	2640	2787	2933	3080	3227	48.89
10 3	987	1062	1137	1212	1287	25.06	20 3	2692	2840	2989	3137	3286	49.50
10 6	1020	1097	1174	1251	1328	25.67	20 6	2744	2894	3044	3195	3345	50.11
10 9	1054	1133	1212	1291	1370	26.28	20 9	2796	2948	3100	3253	3405	50.72

Depth of cut- ting.	BREADTH OF BASE.					One perpend. foot in breadth.	Depth of cut- ting.	BREADTH OF BASE.					One perpend. foot in breadth.
	24 ft.	27 ft.	30 ft.	33 ft.	36 ft.			24 ft.	27 ft.	30 ft.	33 ft.	36 ft.	
ft. in.	cu. y.	cu. y.	cu. y.	cu. y.	cu. y.	cu. yds.	ft. in.	cu. y.	cu. y.	cu. y.	cu. y.	cu. y.	cu. yds.
21 0	2849	3003	3157	3311	3465	51·33	31 0	5342	5570	5797	6024	6252	75·78
21 3	2902	3058	3214	3370	3526	51·94	31 3	5414	5643	5872	6102	6331	76·39
21 6	2956	3114	3272	3429	3587	52·55	31 6	5486	5717	5948	6179	6410	77·
21 9	3011	3170	3330	3489	3649	53·17	31 9	5559	5792	6025	6257	6490	77·61
22 0	3065	3227	3388	3549	3711	53·78	32 0	5632	5867	6101	6336	6571	78·22
22 3	3121	3284	3447	3610	3773	54·39	32 3	5706	5942	6179	6415	6652	78·83
22 6	3176	3341	3506	3671	3836	55·	32 6	5780	6018	6256	6495	6733	79·44
22 9	3232	3399	3566	3733	3900	55·61	32 9	5854	6094	6334	6575	6815	80·06
23 0	3289	3458	3626	3795	3964	56·22	33 0	5929	6171	6413	6655	6897	80·67
23 3	3346	3517	3687	3858	4028	56·83	33 3	6004	6248	6492	6736	6980	81·28
23 6	3404	3576	3748	3921	4093	57·44	33 6	6080	6326	6572	6817	7063	81·89
23 9	3462	3636	3810	3984	4158	58·06	33 9	6157	6404	6622	6899	7147	82·50
24 0	3520	3696	3872	4048	4224	58·67	34 0	6233	6483	6732	6981	7231	83·11
24 3	3579	3757	3935	4112	4290	59·28	34 3	6311	6562	6813	7064	7315	83·72
24 6	3638	3818	3998	4177	4357	59·89	34 6	6388	6641	6894	7147	7400	84·33
24 9	3698	3880	4061	4243	4424	60·50	34 9	6466	6721	6976	7231	7486	84·94
25 0	3758	3942	4125	4308	4492	61·11	35 0	6545	6802	7058	7315	7572	85·55
25 3	3819	4004	4189	4375	4560	61·72	35 3	6624	6883	7141	7400	7658	86·17
25 6	3880	4067	4254	4441	4628	62·33	35 6	6704	6964	7224	7485	7745	86·78
25 9	3942	4131	4320	4508	4697	62·94	35 9	6784	7046	7308	7570	7832	87·39
26 0	4004	4195	4385	4576	4767	63·55	36 0	6864	7128	7392	7656	7920	88·
26 3	4067	4259	4452	4644	4837	64·17	36 3	6945	7211	7477	7742	8008	88·61
26 6	4130	4324	4518	4713	4907	64·78	36 6	7026	7294	7562	7829	8097	89·22
26 9	4193	4389	4585	4782	4978	65·39	36 9	7108	7378	7647	7917	8186	89·83
27 0	4257	4455	4653	4851	5049	66·	37 0	7190	7462	7733	8004	8276	90·44
27 3	4321	4521	4721	4921	5121	66·61	37 3	7273	7546	7819	8093	8366	91·06
27 6	4386	4588	4790	4991	5193	67·22	37 6	7356	7631	7906	8181	8456	91·67
27 9	4452	4655	4859	5062	5266	67·83	37 9	7440	7717	7994	8270	8547	92·28
28 0	4517	4723	4928	5133	5339	68·44	38 0	7524	7803	8081	8360	8639	92·89
28 3	4584	4791	4998	5205	5412	69·06	38 3	7609	7889	8170	8450	8731	93·50
28 6	4650	4859	5068	5277	5486	69·67	38 6	7694	7976	8258	8541	8823	94·11
28 9	4717	4928	5139	5350	5561	70·28	38 9	7779	8063	8347	8632	8916	94·72
29 0	4785	4998	5210	5423	5636	70·89	39 0	7865	8151	8437	8723	9009	95·33
29 3	4853	5068	5282	5497	5711	71·50	39 3	7951	8239	8527	8815	9103	95·94
29 6	4922	5138	5354	5571	5787	72·11	39 6	8038	8328	8618	8907	9197	96·55
29 9	4991	5209	5427	5645	5863	72·72	39 9	8126	8417	8709	9000	9292	97·17
30 0	5060	5280	5500	5720	5940	73·33	40 0	8213	8507	8800	9093	9387	97·78
30 3	5130	5352	5574	5795	6017	73·94	40 3	8302	8597	8892	9187	9482	98·39
30 6	5200	5424	5648	5871	6095	74·55	40 6	8390	8687	8984	9281	9578	99·
30 9	5271	5497	5722	5948	6173	75·17	40 9	8479	8778	9077	9376	9675	99·61

EXCAVATION AND EMBANKMENT.

TABLE III.—FIRST SERIES.

Side of Slopes, 2 Horizontal, to each Perpendicular Foot.

66 FEET CHAIN.

Depth of cut- ting.	BREADTH OF BASE.					One perpend. foot in breadth.	Depth of cut- ting.	BREADTH OF BASE.					One perpend. foot in breadth.
	24 ft.	27 ft.	30 ft.	33 ft.	36 ft.			24 ft.	27 ft.	30 ft.	33 ft.	36 ft.	
ft. in.	cu. y.	cu. y.	cu. y.	cu. y.	cu. y.	cu. yds.	ft. in.	cu. y.	cu. y.	cu. y.	cu. y.	cu. y.	cu. yds.
1 0	64	71	78	86	93	2-44	11 0	1237	1318	1398	1479	1560	26-89
1 3	81	90	99	109	118	3-06	11 3	1279	1361	1444	1526	1609	27-50
1 6	99	110	121	132	143	3-67	11 6	1321	1406	1490	1574	1659	28-11
1 9	118	130	143	156	169	4-28	11 9	1364	1450	1537	1623	1709	28-72
2 0	137	152	166	181	196	4-89	12 0	1408	1496	1584	1672	1760	29-33
2 3	157	173	190	206	223	5-50	12 3	1452	1542	1632	1722	1812	29-94
2 6	177	196	214	232	251	6-11	12 6	1497	1589	1681	1772	1864	30-55
2 9	198	218	239	259	279	6-72	12 9	1543	1636	1730	1823	1917	31-17
3 0	220	242	264	286	308	7-33	13 0	1589	1684	1780	1875	1970	31-78
3 3	242	266	290	314	338	7-94	13 3	1636	1733	1830	1927	2024	32-39
3 6	265	291	317	342	368	8-55	13 6	1683	1782	1881	1980	2079	33-
3 9	289	316	344	371	399	9-17	13 9	1731	1832	1933	2033	2134	33-61
4 0	313	342	372	401	430	9-78	14 0	1780	1882	1985	2088	2190	34-22
4 3	338	369	400	431	462	10-39	14 3	1829	1933	2038	2142	2247	34-83
4 6	363	396	429	462	495	11-	14 6	1879	1985	2091	2198	2304	35-44
4 9	389	424	459	493	528	11-61	14 9	1929	2037	2145	2254	2362	36-06
5 0	416	452	489	526	562	12-22	15 0	1980	2090	2200	2310	2420	36-67
5 3	443	481	520	558	597	12-83	15 3	2032	2143	2255	2367	2479	37-28
5 6	471	511	551	592	632	13-44	15 6	2084	2198	2311	2425	2539	37-89
5 9	499	541	583	626	668	14-06	15 9	2137	2252	2368	2483	2599	38-50
6 0	528	572	616	660	704	14-67	16 0	2190	2308	2425	2542	2660	39-11
6 3	558	603	649	695	741	15-28	16 3	2244	2363	2483	2602	2721	39-72
6 6	588	636	683	731	779	15-89	16 6	2299	2420	2541	2662	2783	40-33
6 9	619	668	718	767	817	16-50	16 9	2354	2477	2600	2723	2846	40-94
7 0	650	702	753	804	856	17-11	17 0	2410	2535	2660	2784	2909	41-55
7 3	682	735	789	842	895	17-72	17 3	2467	2593	2720	2846	2973	42-17
7 6	715	770	825	880	935	18-33	17 6	2524	2652	2781	2909	3037	42-78
7 9	748	805	862	919	976	18-94	17 9	2582	2712	2842	2972	3102	43-39
8 0	782	841	900	958	1017	19-55	18 0	2640	2772	2904	3036	3168	44-
8 3	817	877	938	998	1059	20-17	18 3	2699	2833	2967	3100	3234	44-61
8 6	852	914	977	1039	1101	20-78	18 6	2759	2894	3030	3166	3301	45-22
8 9	888	952	1016	1080	1144	21-39	18 9	2819	2956	3094	3231	3369	45-83
9 0	924	990	1056	1122	1188	22-	19 0	2880	3019	3158	3298	3437	46-44
9 3	961	1029	1097	1164	1232	22-61	19 3	2941	3082	3223	3365	3506	47-06
9 6	999	1068	1138	1208	1277	23-22	19 6	3003	3146	3289	3432	3575	47-67
9 9	1037	1108	1180	1251	1323	23-83	19 9	3066	3210	3355	3500	3645	48-28
10 0	1076	1149	1222	1296	1369	24-44	20 0	3129	3276	3422	3569	3716	48-89
10 3	1115	1199	1265	1341	1416	25-06	20 3	3193	3341	3490	3638	3787	49-50
10 6	1155	1232	1309	1386	1463	25-67	20 6	3257	3408	3558	3708	3859	50-11
10 9	1196	1274	1353	1432	1511	26-28	20 9	3322	3474	3627	3779	3931	50-72

Depth of cut- ting.	BREADTH OF BASE.					One perpend. foot in breadth.	Depth of cut- ting.	BREADTH OF BASE.				One perpend. foot in breadth.
	24 ft.	27 ft.	30 ft.	33 ft.	36 ft.			24 ft.	27 ft.	30 ft.	33 ft.	
ft. in.	cu. y.	cu. y.	cu. y.	cu. v.	u. y.	cu. yds.	ft. in.	cu. y.	cu. y.	cu. y.	cu. y.	cu. yds.
21 0	3358	3542	3696	3859	4004	51-33	34 0	7646	7896	8145	8394	83-11
21 3	3454	3610	3766	3922	4078	51-94	34 3	7744	7995	8247	8498	83-72
21 6	3521	3679	3837	3994	4152	52-55	34 6	7843	8096	8349	8602	84-33
21 9	3589	3748	3908	4067	4227	53-17	34 9	7942	8197	8452	8707	84-94
22 0	3657	3818	3980	4141	4302	53-78	35 0	8042	8299	8556	8812	85-55
22 3	3726	3889	4052	4215	4378	54-39	35 3	8143	8401	8660	8918	86-17
22 6	3795	3960	4125	4290	4455	55-	35 6	8244	8504	8765	9025	86-78
22 9	3865	4032	4199	4365	4532	55-61	35 9	8346	8608	8870	9132	87-39
23 0	3936	4104	4273	4442	4610	56-22	36 0	8448	8712	8976	9240	88-
23 3	4007	4177	4348	4518	4689	56-83	36 3	8551	8817	9083	9348	88-61
23 6	4079	4251	4423	4596	4768	57-44	36 6	8655	8922	9190	9458	89-22
23 9	4151	4325	4499	4674	4848	58-06	36 9	8759	9028	9298	9567	89-83
24 0	4224	4400	4576	4752	4928	58-67	37 0	8864	9135	9406	9678	90-44
24 3	4298	4475	4653	4831	5009	59-28	37 3	8969	9242	9515	9789	91-06
24 6	4372	4552	4731	4911	5091	59-89	37 6	9075	9350	9625	9900	91-67
24 9	4447	4628	4810	4991	5173	60-50	37 9	9182	9458	9735	10012	92-28
25 0	4522	4706	4889	5072	5256	61-11	38 0	9289	9568	9846	10125	92-89
25 3	4598	4783	4969	5154	5339	61-72	38 3	9397	9677	9958	10238	93-50
25 6	4675	4862	5049	5236	5423	62-33	38 6	9505	9788	10070	10352	94-11
25 9	4752	4941	5130	5319	5508	62-94	38 9	9614	9898	10183	10467	94-72
26 0	4830	5021	5212	5402	5593	63-55	39 0	9724	10010	10296	10582	95-33
26 3	4909	5101	5294	5486	5679	64-17	39 3	9834	10122	10410	10698	95-94
26 6	4988	5182	5377	5571	5765	64-78	39 6	9945	10235	10525	10814	96-55
26 9	5068	5264	5460	5656	5852	65-39	39 9	10057	10348	10640	10931	97-17
27 0	5148	5346	5544	5742	5940	66-	40 0	10169	10462	10756	11049	97-78
27 3	5229	5429	5629	5828	6028	66-61	40 3	10282	10577	10872	11167	98-39
27 6	5311	5512	5714	5916	6117	67-22	40 6	10395	10692	10989	11286	99-
27 9	5393	5596	5800	6003	6207	67-83	40 9	10509	10808	11107	11405	99-61
28 0	5476	5681	5886	6092	6297	68-44	41 0	10624	10924	11225	11526	100-22
28 3	5559	5766	5973	6181	6388	69-06	41 3	10739	11041	11344	11646	100-83
28 6	5643	5852	6061	6270	6479	69-67	41 6	10855	11159	11463	11768	101-44
28 9	5728	5938	6149	6360	6571	70-28	41 9	10971	11277	11583	11890	102-06
29 0	5813	6026	6238	6451	6664	70-89	42 0	11088	11396	11704	12012	102-67
29 3	5899	6113	6328	6542	6757	71-50	42 3	11206	11515	11825	12135	103-28
29 6	5985	6202	6418	6634	6851	72-11	42 6	11324	11636	11947	12259	103-89
29 9	6072	6290	6509	6727	6945	72-72	42 9	11443	11756	12070	12383	104-50
30 0	6160	6380	6600	6820	7040	73-33	43 0	11562	11878	12193	12508	105-11
30 3	6248	6470	6692	6914	7136	73-94	43 3	11682	12000	12317	12634	105-72
30 6	6337	6561	6785	7008	7232	74-55	43 6	11803	12122	12441	12760	106-33
30 9	6427	6652	6878	7103	7329	75-17	43 9	11924	12245	12566	12887	106-94
31 0	6517	6744	6972	7199	7426	75-78	44 0	12046	12369	12692	13014	107-55
31 3	6608	6837	7066	7295	7524	76-39	44 3	12169	12493	12818	13142	108-17
31 6	6699	6930	7161	7392	7623	77-	44 6	12292	12618	12945	13271	108-78
31 9	6791	7024	7257	7489	7722	77-61	44 9	12416	12744	13072	13400	109-39
32 0	6884	7118	7353	7588	7822	78-22	45 0	12540	12870	13200	13530	110-
32 3	6977	7213	7450	7686	7923	78-83	45 3	12665	12997	13329	13660	110-61
32 6	7071	7309	7547	7786	8024	79-44	45 6	12791	13124	13458	13792	111-22
32 9	7165	7405	7645	7886	8126	80-06	45 9	12917	13252	13588	13923	111-83
33 0	7260	7502	7744	7986	8228	80-67	46 0	13044	13381	13718	14056	112-44
33 3	7356	7599	7843	8087	8331	81-28	46 3	13171	13510	13849	14189	113-06
33 6	7452	7698	7943	8189	8435	81-89	46 6	13299	13640	13981	14322	113-67
33 9	7549	7796	8044	8291	8539	82-50	46 9	13428	13770	14113	14456	114-28

TABLES

OF
EXCAVATION AND EMBANKMENT.

TABLE I.—SECOND SERIES.

Side of Slopes 1½, Horizontal, to each Perpendicular Foot.

100 FEET CHAIN.

Depth of Cut.		BREADTH OF BASE, 15 FEET.							
		Depth of Cutting in Feet and Tenths of a Foot.							
feet.	cub. yard.	feet.	cub. yard.	feet.	cub. yard.	feet.	cub. yard.	feet.	cub. yard.
0	0.0	5	416.6	10	1111.1	15	2083.3	20	3333.3
1	5.6	6	427.8	11	1127.8	16	2105.6	21	3361.1
2	11.3	7	439.1	12	1144.6	17	2128.0	22	3389.0
3	17.2	8	450.5	13	1161.6	18	2150.5	23	3417.0
4	23.1	9	462.0	14	1178.6	19	2173.1	24	3445.1
5	29.2	10	473.6	15	1195.8	20	2195.8	25	3473.3
6	35.3	11	485.3	16	1213.1	21	2218.6	26	3501.6
7	41.6	12	497.2	17	1230.5	22	2241.6	27	3530.0
8	48.0	13	509.1	18	1248.0	23	2264.6	28	3558.5
9	54.5	14	521.1	19	1265.6	24	2287.8	29	3587.1
1	61.1	6	533.3	11	1283.3	16	2311.1	21	3616.6
1	67.8	7	545.6	12	1301.2	17	2335.0	22	3645.4
2	74.7	8	558.0	13	1319.1	18	2358.0	23	3674.4
3	81.6	9	570.5	14	1337.2	19	2381.6	24	3703.4
4	88.7	10	583.1	15	1355.3	20	2405.3	25	3732.5
5	95.8	11	595.8	16	1373.6	21	2429.1	26	3760.8
6	103.1	12	608.6	17	1392.0	22	2453.1	27	3790.1
7	110.5	13	621.6	18	1410.5	23	2477.2	28	3819.5
8	118.0	14	634.6	19	1429.1	24	2501.3	29	3849.0
9	125.6	15	647.8	20	1447.8	25	2525.6	30	3878.6
2	133.3	7	661.1	12	1466.7	17	2550.0	22	3911.0
1	141.2	8	674.5	13	1485.6	18	2574.5	23	3941.0
2	149.1	9	688.0	14	1504.6	19	2599.1	24	3971.1
3	157.1	10	701.6	15	1523.8	20	2623.8	25	4001.3
4	165.3	11	715.3	16	1543.1	21	2648.6	26	4031.6
5	173.6	12	729.2	17	1562.5	22	2673.6	27	4062.0
6	182.0	13	743.1	18	1582.0	23	2698.6	28	4092.5
7	190.5	14	757.2	19	1601.6	24	2723.8	29	4123.1
8	199.1	15	771.3	20	1621.3	25	2749.1	30	4153.8
9	207.8	16	785.6	21	1641.2	26	2774.5	31	4184.6
3	216.7	8	800.0	13	1661.1	18	2800.0	23	4216.5
1	225.6	9	814.5	14	1681.1	19	2825.6	24	4247.6
2	234.7	10	829.1	15	1701.3	20	2851.3	25	4278.8
3	243.8	11	843.8	16	1721.6	21	2877.2	26	4310.1
4	253.1	12	858.6	17	1742.0	22	2903.1	27	4341.5
5	262.5	13	873.6	18	1762.5	23	2929.2	28	4373.0
6	272.0	14	888.6	19	1783.1	24	2955.3	29	4404.6
7	281.6	15	903.8	20	1803.8	25	2981.6	30	4436.3
8	290.3	16	919.1	21	1824.6	26	3007.9	31	4468.1
9	300.1	17	934.5	22	1845.6	27	3034.5	32	4500.0
4	311.1	9	950.0	14	1866.6	19	3061.1	24	4533.1
1	321.1	10	965.6	15	1887.8	20	3087.8	25	4565.3
2	331.3	11	981.3	16	1909.1	21	3114.6	26	4597.6
3	341.6	12	997.2	17	1930.5	22	3141.6	27	4630.0
4	352.0	13	1013.1	18	1952.0	23	3168.6	28	4662.5
5	362.5	14	1029.2	19	1973.6	24	3195.8	29	4695.1
6	373.1	15	1045.3	20	1995.3	25	3223.1	30	4727.8
7	383.8	16	1061.6	21	2017.1	26	3250.5	31	4760.6
8	394.6	17	1078.0	22	2039.1	27	3278.0	32	4793.5
9	405.6	18	1094.5	23	2061.2	28	3305.6	33	4826.5

BREADTH OF BASE, 15 FEET.									
Depth of Cutting in Feet and Tenths of a Foot.									
Depth of Cut.									
feet.	cub. yard.	feet.	cub. yard.	feet.	cub. yard.	feet.	cub. yard.	feet.	cub. yard.
25·0	4860·8	27·0	5549·5	29·0	6282·6	31·0	7061·0	33·0	7882·9
·1	4894·1	·1	5585·0	·1	6320·3	·1	7101·0	·1	7925·0
·2	4927·5	·2	5620·6	·2	6358·1	·2	7142·1	·2	7967·2
·3	4961·0	·3	5656·3	·3	6396·0	·3	7183·3	·3	8009·5
·4	4994·6	·4	5692·1	·4	6434·0	·4	7224·6	·4	8051·9
·5	5028·3	·5	5728·0	·5	6472·1	·5	7266·0	·5	8094·4
·6	5062·1	·6	5764·0	·6	6510·3	·6	7307·5	·6	8137·0
·7	5096·0	·7	5800·1	·7	6548·6	·7	7349·1	·7	8179·7
·8	5130·0	·8	5836·3	·8	6587·1	·8	7390·8	·8	8222·5
·9	5164·1	·9	5872·6	·9	6626·0	·9	7432·6	·9	8265·4
26·0	5199·6	28·0	5910·5	30·0	6666·6	32·0	7466·4	34·0	8310·5
·1	5234·0	·1	5947·1	·1	6706·6	·1	7507·4	·1	8353·5
·2	5268·5	·2	5983·8	·2	6746·7	·2	7548·5	·2	8396·7
·3	5303·1	·3	6020·6	·3	6786·9	·3	7589·7	·3	8440·0
·4	5337·8	·4	6057·5	·4	6827·2	·4	7631·0	·4	8483·4
·5	5372·6	·5	6094·5	·5	6867·6	·5	7672·4	·5	8526·9
·6	5407·5	·6	6131·1	·6	6908·2	·6	7713·9	·6	8570·5
·7	5442·5	·7	6168·8	·7	6948·9	·7	7755·5	·7	8614·2
·8	5477·6	·8	6206·1	·8	6989·7	·8	7797·2	·8	8658·0
·9	5512·8	·9	6243·5	·9	7030·6	·9	7839·0	·9	8701·9

TABLE II.—SECOND SERIES.

Side of Slopes 1½, Horizontal, to each Perpendicular Foot.

66 FEET CHAIN.

BREADTH OF BASE, 15 FEET.									
Depth of Cutting in Feet and Tenths of a Foot.									
Depth of Cut.									
feet.	cub. yard.	feet.	cub. yard.	feet.	cub. yard.	feet.	cub. yard.	feet.	cub. yard.
·0	0·00	3·0	143·0	6·0	352·0	9·0	627·0	12·0	968·0
·1	3·70	·1	148·9	·1	360·1	·1	637·3	·1	980·5
·2	7·5	·2	154·9	·2	368·3	·2	647·7	·2	993·1
·3	11·3	·3	160·9	·3	376·5	·3	658·1	·3	1005·7
·4	15·2	·4	167·1	·4	384·9	·4	668·6	·4	1018·4
·5	19·2	·5	173·2	·5	393·2	·5	679·2	·5	1031·2
·6	23·3	·6	179·5	·6	401·7	·6	689·9	·6	1044·1
·7	27·5	·7	185·9	·7	410·3	·7	700·7	·7	1057·1
·8	31·7	·8	192·3	·8	418·9	·8	711·5	·8	1070·1
·9	36·0	·9	198·8	·9	427·6	·9	722·4	·9	1083·2
1·0	40·3	4·0	205·3	7·0	436·3	10·0	733·3	13·0	1096·3
·1	44·8	·1	212·0	·1	445·2	·1	744·4	·1	1109·6
·2	49·3	·2	218·7	·2	454·1	·2	755·5	·2	1122·9
·3	53·9	·3	225·5	·3	463·1	·3	766·7	·3	1136·3
·4	58·5	·4	232·3	·4	472·1	·4	777·9	·4	1149·7
·5	63·2	·5	239·2	·5	481·2	·5	789·2	·5	1163·2
·6	68·1	·6	246·2	·6	490·4	·6	800·7	·6	1176·8
·7	72·9	·7	253·3	·7	499·7	·7	812·1	·7	1190·5
·8	77·9	·8	260·5	·8	509·1	·8	823·7	·8	1204·3
·9	82·9	·9	267·7	·9	518·5	·9	835·3	·9	1218·1
2·0	88·0	5·0	275·0	8·0	528·0	11·0	847·0	14·0	1232·0
·1	93·2	·1	282·4	·1	537·6	·1	858·8	·1	1246·0
·2	98·4	·2	289·8	·2	547·2	·2	870·6	·2	1260·0
·3	103·7	·3	297·3	·3	556·0	·3	882·5	·3	1274·1
·4	109·1	·4	304·9	·4	566·7	·4	894·5	·4	1288·3
·5	114·6	·5	312·6	·5	576·6	·5	906·6	·5	1302·6
·6	120·1	·6	320·3	·6	586·5	·6	918·7	·6	1316·9
·7	125·7	·7	328·1	·7	596·5	·7	930·9	·7	1331·3
·8	131·4	·8	336·0	·8	606·6	·8	943·2	·8	1345·8
·9	137·2	·9	344·0	·9	616·8	·9	955·6	·9	1360·4

Depth of Cut.		BREADTH OF BASE, 15 FEET. Depth of Cutting in Feet and Tenths of a Foot.							
feet.	cub. yard.	feet.	cub. yard.	feet.	cub. yard.	feet.	cub. yard.	feet.	cub. yard.
15-0	1375-0	20-0	2200-0	25-0	3208-3	30-0	4400-0	35-0	5775-0
1	1389-7	1	2218-4	1	3230-4	1	4425-7	1	5804-4
2	1404-5	2	2236-8	2	3252-5	2	4451-5	2	5833-8
3	1419-3	3	2255-3	3	3274-7	3	4477-3	3	5863-3
4	1434-2	4	2273-9	4	3296-9	4	4503-2	4	5892-9
5	1449-2	5	2292-6	5	3319-2	5	4529-2	5	5922-6
6	1464-3	6	2311-3	6	3341-6	6	4555-3	6	5952-3
7	1479-5	7	2330-1	7	3364-1	7	4581-5	7	5982-1
8	1494-7	8	2349-0	8	3386-7	8	4607-7	8	6012-0
9	1510-0	9	2368-0	9	3409-3	9	4634-0	9	6042-0
16-0	1525-3	21-0	2387-0	26-0	3432-0	31-0	4660-3	36-0	6072-0
1	1540-8	1	2406-1	1	3454-8	1	4686-8	1	6102-1
2	1556-3	2	2425-3	2	3477-6	2	4713-3	2	6132-3
3	1571-9	3	2444-5	3	3500-5	3	4739-9	3	6162-5
4	1587-5	4	2463-8	4	3523-5	4	4766-5	4	6192-8
5	1603-2	5	2483-2	5	3546-6	5	4793-2	5	6223-2
6	1619-0	6	2502-7	6	3569-7	6	4820-0	6	6253-7
7	1634-9	7	2522-3	7	3592-9	7	4846-9	7	6284-3
8	1650-9	8	2541-9	8	3616-2	8	4873-9	8	6314-9
9	1666-9	9	2561-6	9	3639-6	9	4900-9	9	6345-6
17-0	1683-0	22-0	2581-3	27-0	3663-0	32-0	4928-0	37-0	6376-3
1	1699-2	1	2601-2	1	3686-5	1	4955-2	1	6407-2
2	1715-4	2	2621-1	2	3710-1	2	4982-4	2	6438-1
3	1731-7	3	2641-1	3	3733-7	3	5009-7	3	6469-1
4	1748-1	4	2661-1	4	3757-5	4	5037-1	4	6500-1
5	1764-6	5	2681-2	5	3781-2	5	5064-6	5	6531-2
6	1781-1	6	2701-5	6	3805-1	6	5092-1	6	6562-5
7	1797-7	7	2721-7	7	3829-1	7	5119-7	7	6593-7
8	1814-4	8	2742-1	8	3853-1	8	5147-4	8	6625-1
9	1831-2	9	2762-5	9	3877-2	9	5175-2	9	6656-5
18-0	1848-0	23-0	2783-0	28-0	3901-3	33-0	5203-0	38-0	6688-0
1	1864-9	1	2803-6	1	3925-6	1	5230-9	1	6719-6
2	1881-9	2	2824-2	2	3949-9	2	5258-9	2	6751-2
3	1898-9	3	2844-9	3	3974-3	3	5286-9	3	6782-9
4	1916-0	4	2865-7	4	3998-7	4	5315-0	4	6814-7
5	1933-2	5	2886-6	5	4023-2	5	5343-2	5	6846-6
6	1950-5	6	2907-5	6	4047-8	6	5371-5	6	6878-5
7	1967-9	7	2928-5	7	4072-5	7	5399-9	7	6910-5
8	1985-3	8	2949-6	8	4097-3	8	5428-3	8	6942-6
9	2002-8	9	2970-8	9	4122-1	9	5456-8	9	6974-8
19-0	2020-3	24-0	2992-0	29-0	4147-0	34-0	5485-3	39-0	7007-0
1	2038-0	1	3013-3	1	4172-0	1	5514-0	1	7039-3
2	2055-7	2	3034-7	2	4197-0	2	5542-7	2	7071-7
3	2073-5	3	3056-1	3	4222-1	3	5571-5	3	7104-1
4	2091-3	4	3077-6	4	4247-3	4	5600-3	4	7136-6
5	2109-2	5	3099-2	5	4272-6	5	5629-2	5	7169-2
6	2127-2	6	3120-9	6	4297-9	6	5658-2	6	7201-9
7	2145-3	7	3142-7	7	4323-3	7	5687-3	7	7234-7
8	2163-5	8	3164-5	8	4348-8	8	5716-5	8	7267-5
9	2181-7	9	3186-4	9	4374-4	9	5745-7	9	7300-4

EXCAVATION AND EMBANKMENT.

TABLE III.—SECOND SERIES.

Side of Slopes 1½, Horizontal, to each Perpendicular Foot.

CHAINS, 66 FEET EACH.

BREADTH OF BASE, 20 FEET.									
Depth of Cutting in Feet and Tenths of a Foot.									
Depth of Cut.									
feet.	cub. yard.	feet.	cub. yard.	feet.	cub. yard.	feet.	cub. yard.	feet.	cub. yard.
0 0	0 00	5 0	672 22	10 0	1711 11	15 0	3116 67	20 0	4888 89
1	9 85	1	689 41	1	1735 63	1	3148 52	1	4928 07
2	19 85	2	706 74	2	1760 29	2	3180 51	2	4967 40
3	29 99	3	724 22	3	1785 10	3	3212 66	3	5006 88
4	40 28	4	741 84	4	1810 06	4	3244 95	4	5046 51
5	50 72	5	759 61	5	1835 17	5	3277 39	5	5086 28
6	61 31	6	777 53	6	1860 43	6	3309 97	6	5126 20
7	72 04	7	795 59	7	1885 81	7	3342 70	7	5166 26
8	82 91	8	813 80	8	1911 36	8	3375 58	8	5206 47
9	93 94	9	832 16	9	1937 05	9	3408 61	9	5246 83
1 0	105 11	6 0	850 67	11 0	1962 89	16 0	3441 78	21 0	5287 33
1	116 43	1	869 32	1	1988 87	1	3475 09	1	5327 98
2	127 89	2	888 12	2	2015 00	2	3508 56	2	5368 78
3	139 50	3	907 06	3	2041 28	3	3542 17	3	5409 73
4	151 26	4	926 15	4	2067 71	4	3575 93	4	5450 82
5	163 17	5	945 39	5	2094 28	5	3609 83	5	5492 06
6	175 22	6	964 77	6	2120 99	6	3643 88	6	5533 44
7	187 42	7	984 30	7	2147 86	7	3678 08	7	5574 97
8	199 76	8	1003 98	8	2174 87	8	3712 43	8	5616 65
9	212 25	9	1023 81	9	2202 03	9	3746 92	9	5658 47
2 0	224 89	7 0	1043 78	12 0	2229 33	17 0	3781 55	22 0	5700 44
1	237 67	1	1063 94	1	2256 78	1	3816 34	1	5742 56
2	250 60	2	1084 16	2	2284 38	2	3851 27	2	5784 83
3	263 69	3	1104 57	3	2312 13	3	3886 35	3	5827 24
4	276 91	4	1125 13	4	2340 02	4	3921 57	4	5869 80
5	290 28	5	1145 83	5	2368 06	5	3956 94	5	5912 50
6	303 80	6	1166 68	6	2396 24	6	3992 46	6	5955 35
7	317 46	7	1187 68	7	2424 57	7	4028 12	7	5998 35
8	331 27	8	1208 83	8	2453 05	8	4063 94	8	6041 49
9	345 23	9	1230 12	9	2481 67	9	4099 89	9	6084 78
3 0	359 33	8 0	1251 56	13 0	2510 44	18 0	4136 00	23 0	6128 22
1	373 58	1	1273 14	1	2539 36	1	4172 25	1	6171 81
2	387 98	2	1294 87	2	2568 43	2	4208 65	2	6215 54
3	402 53	3	1316 75	3	2597 64	3	4245 19	3	6259 42
4	417 22	4	1338 77	4	2627 00	4	4281 88	4	6303 44
5	432 06	5	1360 94	5	2656 50	5	4318 72	5	6347 61
6	447 04	6	1383 26	6	2686 15	6	4355 71	6	6391 93
7	462 17	7	1405 73	7	2716 95	7	4392 84	7	6436 39
8	477 45	8	1428 34	8	2746 89	8	4430 12	8	6481 00
9	492 87	9	1451 10	9	2776 98	9	4467 54	9	6525 76
4 0	508 44	9 0	1474 00	14 0	2806 22	19 0	4505 11	24 0	6570 67
1	524 16	1	1497 05	1	2836 61	1	4542 83	1	6615 72
2	540 03	2	1520 25	2	2867 14	2	4580 69	2	6660 92
3	556 04	3	1543 59	3	2897 81	3	4618 70	3	6706 26
4	572 20	4	1567 08	4	2928 64	4	4656 86	4	6751 75
5	588 50	5	1590 72	5	2959 61	5	4695 16	5	6797 39
6	604 95	6	1614 51	6	2990 73	6	4733 61	6	6843 17
7	621 55	7	1638 44	7	3021 99	7	4772 21	7	6889 10
8	638 29	8	1662 52	8	3053 40	8	4810 95	8	6935 18
9	655 18	9	1686 74	9	3084 96	9	4849 84	9	6981 41

BREADTH OF BASE, 20 FEET.											
Depth of Cutting in Feet and Tenths of a Foot.											
Depth of Cut.		feet.	cub. yard.	feet.	cub. yard.	feet.	cub. yard.	feet.	cub. yard.	feet.	cub. yard.
25	0	7027.78	28	0	8487.11	31	0	10078.44	34	0	11801.78
	1	7074.30		1	8538.03		1	10133.76		1	11861.50
	2	7120.96		2	8589.09		2	10189.23		2	11921.36
	3	7167.77		3	8640.30		3	10244.84		3	11981.37
	4	7214.73		4	8691.66		4	10300.60		4	12041.53
	5	7261.83		5	8743.17		5	10356.50		5	12101.83
	6	7309.08		6	8794.82		6	10412.55		6	12162.28
	7	7356.48		7	8846.62		7	10468.75		7	12222.88
	8	7404.03		8	8898.56		8	10525.09		8	12283.63
	9	7451.72		9	8950.65		9	10581.58		9	12344.52
26	0	7499.56	29	0	9002.89	32	0	10638.22	35	0	12405.56
	1	7547.54		1	9055.27		1	10695.01		1	12466.74
	2	7595.67		2	9107.80		2	10751.94		2	12528.07
	3	7643.95		3	9160.48		3	10809.02		3	12589.55
	4	7692.37		4	9213.31		4	10866.24		4	12651.17
	5	7740.94		5	9266.28		5	10923.61		5	12712.94
	6	7789.66		6	9319.40		6	10981.13		6	12774.86
	7	7838.53		7	9372.66		7	11038.79		7	12836.93
	8	7887.54		8	9426.07		8	11096.50		8	12899.14
	9	7936.70		9	9479.63		9	11154.56		9	12961.50
27	0	7986.00	30	0	9533.33	33	0	11212.67	36	0	13024.00
	1	8035.45		1	9587.18		1	11270.92		1	13086.65
	2	8085.05		2	9641.18		2	11329.32		2	13149.45
	3	8134.79		3	9695.33		3	11387.86		3	13212.39
	4	8184.68		4	9749.62		4	11446.55		4	13275.48
	5	8234.72		5	9804.06		5	11505.39		5	13338.72
	6	8284.91		6	9858.64		6	11564.37		6	13402.11
	7	8335.24		7	9913.37		7	11623.50		7	13465.64
	8	8385.72		8	9968.25		8	11682.78		8	13529.32
	9	8436.34		9	10023.27		9	11742.21		9	13593.14

TABLE IV.—SECOND SERIES.

Side of Slopes 1½, Horizontal, to each Perpendicular Foot.

66 FEET CHAIN.

BREADTH OF BASE, 24 FEET.														
Depth of Cutting in Feet and Tenths of a Foot.														
Depth of Cut.	feet.	cub. yard.	feet.	cub. yard.	feet.	cub. yard.	feet.	cub. yard.	feet.	cub. yard.				
0	0	0:00	2	0	132:0	4	0	293:3	6	0	484:0	8	0	704:0
	1	5:90		1	139:4		1	302:2		1	494:3		1	715:8
	2	11:90		2	146:8		2	311:1		2	504:7		2	727:6
	3	17:90		3	154:3		3	320:1		3	515:1		3	739:5
	4	24:05		4	161:9		4	329:1		4	525:6		4	751:5
	5	30:25		5	169:6		5	338:2		5	536:2		5	763:6
	6	36:52		6	177:3		6	347:4		6	546:9		6	775:7
	7	42:86		7	185:1		7	356:7		7	557:7		7	787:9
	8	49:30		8	193:0		8	366:1		8	568:5		8	800:2
	9	55:80		9	201:0		9	375:5		9	579:4		9	812:6
1	0	62:30	3	0	209:0	5	0	385:0	7	0	590:3	9	0	825:0
	1	69:00		1	217:1		1	394:6		1	601:4		1	837:5
	2	75:70		2	225:3		2	404:2		2	612:5		2	850:1
	3	82:46		3	233:5		3	413:9		3	623:7		3	862:7
	4	89:32		4	241:8		4	423:7		4	634:9		4	875:4
	5	96:25		5	250:2		5	433:6		5	646:2		5	888:2
	6	103:25		6	258:7		6	443:5		6	657:6		6	901:1
	7	110:33		7	267:3		7	453:5		7	669:1		7	914:1
	8	117:48		8	275:9		8	463:6		8	680:7		8	927:1
	9	124:70		9	284:6		9	473:8		9	692:3		9	940:2

Depth
of
Cut.

BREADTH OF BASE, 24 FEET.

Depth of Cutting in Feet and Tenths of a Foot.

feet.	cub. yard.	feet.	cub. yard.	feet.	cub. yard.	feet.	cub. yard.	feet.	cub. yard.
10-0	953-3	16-0	1877-3	22-0	3065-3	28-0	4517-3	34-0	6233-3
-1	966-6	-1	1895-0	-1	3087-4	-1	4543-8	-1	6264-2
-2	979-9	-2	1912-7	-2	3109-5	-2	4570-3	-2	6295-1
-3	993-3	-3	1930-5	-3	3131-7	-3	4596-9	-3	6326-1
-4	1006-7	-4	1948-3	-4	3153-9	-4	4623-5	-4	6357-1
-5	1020-2	-5	1966-2	-5	3176-2	-5	4650-2	-5	6388-2
-6	1033-9	-6	1984-2	-6	3198-7	-6	4677-0	-6	6419-5
-7	1047-5	-7	2002-3	-7	3221-1	-7	4703-9	-7	6450-7
-8	1061-3	-8	2020-5	-8	3243-7	-8	4730-9	-8	6482-1
-9	1075-1	-9	2038-7	-9	3266-3	-9	4757-9	-9	6513-5
11-0	1089-0	17-0	2057-0	23-0	3289-0	29-0	4785-0	35-0	6545-0
-1	1103-0	-1	2075-4	-1	3311-8	-1	4812-2	-1	6576-6
-2	1117-0	-2	2093-8	-2	3334-6	-2	4839-4	-2	6608-2
-3	1131-1	-3	2112-3	-3	3357-5	-3	4866-7	-3	6639-9
-4	1145-3	-4	2130-9	-4	3380-5	-4	4894-1	-4	6671-7
-5	1159-6	-5	2149-6	-5	3403-6	-5	4921-6	-5	6703-6
-6	1173-9	-6	2168-3	-6	3426-7	-6	4949-1	-6	6735-5
-7	1188-3	-7	2187-1	-7	3449-9	-7	4976-7	-7	6767-5
-8	1202-8	-8	2206-0	-8	3473-2	-8	5004-4	-8	6799-6
-9	1217-4	-9	2225-0	-9	3496-6	-9	5032-2	-9	6831-8
12-0	1232-0	18-0	2244-0	24-0	3520-0	30-0	5060-0	36-0	6864-0
-1	1246-7	-1	2263-1	-1	3543-5	-1	5087-9	-1	6896-3
-2	1261-5	-2	2282-3	-2	3567-1	-2	5115-9	-2	6928-7
-3	1276-3	-3	2301-5	-3	3590-7	-3	5143-9	-3	6961-1
-4	1291-2	-4	2320-8	-4	3614-5	-4	5172-0	-4	6993-7
-5	1306-2	-5	2340-2	-5	3638-2	-5	5200-2	-5	7026-2
-6	1321-3	-6	2359-7	-6	3662-1	-6	5228-5	-6	7058-9
-7	1336-5	-7	2379-3	-7	3686-1	-7	5256-9	-7	7091-7
-8	1351-7	-8	2398-9	-8	3710-1	-8	5285-3	-8	7124-5
-9	1367-0	-9	2418-6	-9	3732-2	-9	5313-8	-9	7157-4
13-0	1382-3	19-0	2438-3	25-0	3758-3	31-0	5342-3	37-0	7190-3
-1	1397-8	-1	2458-2	-1	3782-6	-1	5371-0	-1	7223-4
-2	1413-3	-2	2478-1	-2	3806-9	-2	5399-7	-2	7256-5
-3	1428-9	-3	2498-1	-3	3831-3	-3	5428-5	-3	7289-7
-4	1444-5	-4	2518-1	-4	3855-7	-4	5457-3	-4	7322-9
-5	1460-2	-5	2538-2	-5	3880-2	-5	5486-2	-5	7356-2
-6	1476-1	-6	2558-5	-6	3904-8	-6	5515-2	-6	7389-7
-7	1491-9	-7	2578-7	-7	3929-5	-7	5544-3	-7	7423-1
-8	1507-9	-8	2599-1	-8	3954-3	-8	5573-5	-8	7456-7
-9	1523-9	-9	2619-5	-9	3979-1	-9	5602-7	-9	7490-3
14-0	1540-0	20-0	2640-0	26-0	4004-0	32-0	5632-0	38-0	7524-0
-1	1556-2	-1	2660-6	-1	4029-0	-1	5661-4	-1	7557-8
-2	1572-4	-2	2681-2	-2	4054-0	-2	5690-3	-2	7591-6
-3	1588-7	-3	2701-9	-3	4079-1	-3	5720-3	-3	7625-5
-4	1605-1	-4	2722-7	-4	4104-3	-4	5749-9	-4	7659-5
-5	1621-6	-5	2743-6	-5	4129-6	-5	5779-6	-5	7693-6
-6	1638-1	-6	2764-5	-6	4154-9	-6	5809-3	-6	7727-7
-7	1654-7	-7	2785-5	-7	4180-3	-7	5839-1	-7	7761-9
-8	1671-4	-8	2806-6	-8	4205-8	-8	5869-0	-8	7796-2
-9	1688-2	-9	2827-8	-9	4231-4	-9	5899-0	-9	7830-6
15-0	1705-0	21-0	2849-0	27-0	4257-0	33-0	5929-0	39-0	7865-0
-1	1721-9	-1	2870-3	-1	4282-7	-1	5959-1	-1	7899-5
-2	1738-9	-2	2891-7	-2	4308-5	-2	5989-3	-2	7934-1
-3	1755-9	-3	2913-1	-3	4334-3	-3	6019-5	-3	7968-7
-4	1773-1	-4	2934-7	-4	4360-2	-4	6049-8	-4	8003-4
-5	1790-2	-5	2956-2	-5	4386-2	-5	6080-2	-5	8038-2
-6	1807-5	-6	2977-9	-6	4412-3	-6	6110-7	-6	8073-1
-7	1824-9	-7	2999-7	-7	4438-5	-7	6141-3	-7	8108-1
-8	1842-3	-8	3021-5	-8	4464-7	-8	6171-9	-8	8143-1
-9	1859-8	-9	3043-4	-9	4491-0	-9	6202-6	-9	8178-2

EXCAVATION AND EMBANKMENT.

TABLE V.—SECOND SERIES.

Side of Slopes 1½, Horizontal, to each Perpendicular Foot.

100 FEET CHAIN.

BREADTH OF BASE, 25 FEET.									
Depth of Cutting in Feet and Tenths of a Foot.									
Depth of Cut.									
feet.	cub. yard.	feet.	cub. yard.	feet.	cub. yard.	feet.	cub. yard.	feet.	cub. yard.
0 0	0 0	5 0	601 9	10 0	1481 5	15 0	2638 9	20 0	4073 1
1	9 3	1	616 7	1	1501 9	1	2664 7	1	4105 7
2	18 7	2	631 7	2	1522 4	2	2691 0	2	4137 4
3	28 3	3	646 8	3	1543 1	3	2717 1	3	4169 3
4	37 9	4	662 0	4	1563 8	4	2743 5	4	4201 3
5	47 7	5	677 3	5	1584 7	5	2769 9	5	4233 3
6	57 5	6	692 7	6	1605 7	6	2796 4	6	4265 6
7	67 5	7	708 3	7	1626 8	7	2823 1	7	4297 8
8	77 6	8	723 9	8	1648 0	8	2849 8	8	4330 3
9	87 8	9	739 7	9	1669 3	9	2876 7	9	4362 8
1 0	98 1	6 0	755 5	11 0	1690 7	16 0	2903 7	21 0	4394 3
1	108 6	1	771 5	1	1712 3	1	2930 8	1	4427 1
2	119 1	2	787 6	2	1733 9	2	2958 0	2	4459 9
3	129 7	3	803 8	3	1755 7	3	2985 3	3	4492 9
4	140 5	4	820 1	4	1777 5	4	3012 7	4	4526 0
5	151 4	5	836 6	5	1799 5	5	3040 3	5	4559 1
6	162 4	6	853 1	6	1821 6	6	3067 9	6	4592 4
7	173 5	7	869 7	7	1843 8	7	3095 7	7	4625 8
8	184 7	8	886 5	8	1866 1	8	3123 5	8	4659 4
9	196 0	9	903 4	9	1888 5	9	3151 5	9	4693 0
2 0	207 4	7 0	920 4	12 0	1911 1	17 0	3179 6	22 0	4725 8
1	218 9	1	937 5	1	1933 8	1	3207 8	1	4759 6
2	230 6	2	954 7	2	1956 5	2	3236 1	2	4793 6
3	242 3	3	972 0	3	1979 4	3	3264 6	3	4827 6
4	254 2	4	989 4	4	2002 3	4	3293 1	4	4861 8
5	266 2	5	1006 9	5	2025 5	5	3321 7	5	4896 1
6	278 3	6	1024 6	6	2048 6	6	3350 5	6	4930 4
7	290 5	7	1042 3	7	2072 0	7	3379 4	7	4964 8
8	302 8	8	1060 2	8	2095 4	8	3408 3	8	4999 4
9	315 2	9	1078 2	9	2118 9	9	3437 4	9	5034 0
3 0	327 8	8 0	1096 3	13 0	2142 6	18 0	3466 7	23 0	5068 3
1	340 4	1	1114 5	1	2166 3	1	3496 4	1	5103 1
2	353 2	2	1132 8	2	2190 2	2	3525 4	2	5138 1
3	366 1	3	1151 2	3	2214 2	3	3554 9	3	5173 1
4	379 0	4	1169 8	4	2238 3	4	3584 6	4	5208 3
5	392 1	5	1188 4	5	2262 5	5	3614 3	5	5243 6
6	405 3	6	1207 2	6	2286 8	6	3644 2	6	5279 0
7	418 6	7	1226 0	7	2311 2	7	3674 2	7	5314 5
8	432 1	8	1245 0	8	2335 7	8	3704 3	8	5350 1
9	445 6	9	1264 1	9	2360 4	9	3734 5	9	5385 8
4 0	459 3	9 0	1283 3	14 0	2385 2	19 0	3764 8	24 0	5421 9
1	473 0	1	1302 6	1	2410 0	1	3795 2	1	5457 9
2	486 9	2	1321 1	2	2435 0	2	3825 8	2	5493 9
3	500 9	3	1340 6	3	2460 1	3	3856 4	3	5530 1
4	515 0	4	1360 2	4	2485 3	4	3886 2	4	5566 3
5	529 2	5	1380 0	5	2510 6	5	3917 0	5	5602 7
6	543 5	6	1399 9	6	2536 0	6	3948 0	6	5639 2
7	557 9	7	1419 9	7	2561 6	7	3979 1	7	5675 7
8	572 4	8	1439 9	8	2587 2	8	4010 3	8	5712 3
9	587 1	9	1460 1	9	2613 0	9	4041 6	9	5749 0

BREADTH OF BASE, 25 FEET.							
Depth of Cutting in Feet and Tenths of a Foot.							
Depth of Cut.							
feet.	cub. yard.	feet.	cub. yard.	feet.	cub. yard.	feet.	cub. yard.
25 0	5787.0	27 0	6549.8	29 0	7357.1	31 0	8209.0
1	5823.9	1	6588.8	1	7398.3	1	8252.5
2	5861.0	2	6628.0	2	7439.6	2	8296.2
3	5898.2	3	6667.3	3	7481.0	3	8339.9
4	5935.5	4	6706.6	4	7522.6	4	8383.7
5	5972.9	5	6746.1	5	7564.2	5	8427.7
6	6010.3	6	6785.7	6	7606.0	6	8471.8
7	6047.8	7	6825.4	7	7647.8	7	8515.9
8	6085.5	8	6865.2	8	7689.8	8	8560.2
9	6123.2	9	6905.1	9	7732.0	9	8604.6
26 0	6162.8	28 0	6947.9	30 0	7777.7	32 0	8651.5
1	6200.8	1	6988.0	1	7817.0	1	8696.1
2	6238.8	2	7028.3	2	7859.5	2	8740.8
3	6277.0	3	7068.7	3	7902.0	3	8785.6
4	6315.2	4	7109.2	4	7944.6	4	8830.6
5	6353.6	5	7149.7	5	7987.4	5	8875.6
6	6392.1	6	7190.3	6	8030.2	6	8920.8
7	6430.7	7	7231.0	7	8073.2	7	8966.0
8	6469.4	8	7271.8	8	8116.3	8	9011.4
9	6508.3	9	7312.8	9	8159.5	9	9056.9

TABLES
OF EXCAVATION AND EMBANKMENT.
TABLE I.—THIRD SERIES. *Base 1.—Slopes 1 to 1.*

Feet.	1		2		3		4		5		Feet.
	Mult.	Add.	Mult.	Add.	Mult.	Add.	Mult.	Add.	Mult.	Add.	
0	·0185	0·012	·0370	0·049	·0556	0·111	·0741	0·198	·0926	0·308	0
1	·0370	0·037	·0556	0·086	·0741	0·160	·0926	0·259	·1111	0·383	1
2	·0556	0·086	·0741	0·148	·0926	0·235	·1111	0·346	·1296	0·481	2
3	·0741	0·160	·0926	0·235	·1111	0·333	·1296	0·457	·1481	0·605	3
4	·0926	0·259	·1111	0·346	·1296	0·457	·1481	0·593	·1667	0·753	4
5	·1111	0·383	·1296	0·481	·1481	0·605	·1667	0·753	·1852	0·926	5
6	·1296	0·531	·1481	0·642	·1667	0·778	·1852	0·938	·2037	1·123	6
7	·1481	0·704	·1667	0·827	·1852	0·975	·2037	1·148	·2222	1·346	7
8	·1667	0·901	·1852	1·037	·2037	1·296	·2222	1·383	·2407	1·593	8
9	·1852	1·123	·2037	1·272	·2222	1·444	·2407	1·642	·2593	1·864	9
10	·2037	1·370	·2222	1·531	·2407	1·716	·2593	1·926	·2778	2·160	10
11	·2222	1·642	·2407	1·815	·2593	2·012	·2778	2·235	·2963	2·481	11
12	·2407	1·938	·2593	2·123	·2778	2·333	·2963	2·568	·3148	2·827	12
13	·2593	2·259	·2778	2·457	·2963	2·679	·3148	2·926	·3333	3·198	13
14	·2778	2·605	·2963	2·815	·3148	3·049	·3333	3·309	·3519	3·593	14
15	·2963	2·975	·3148	3·198	·3333	3·444	·3519	3·716	·3704	4·012	15
16	·3148	3·370	·3333	3·605	·3519	3·864	·3704	4·148	·3889	4·457	16
17	·3333	3·790	·3519	4·037	·3704	4·309	·3889	4·605	·4074	4·926	17
18	·3519	4·235	·3704	4·494	·3889	4·778	·4074	5·086	·4259	5·420	18
19	·3704	4·704	·3889	4·975	·4074	5·272	·4259	5·593	·4444	5·938	19
20	·3889	5·198	·4074	5·481	·4259	5·790	·4444	6·061	·4630	6·481	20
21	·4074	5·716	·4259	6·012	·4444	6·333	·4630	6·679	·4815	7·049	21
22	·4259	6·259	·4444	6·568	·4630	6·931	·4815	7·259	·5000	7·642	22
23	·4444	6·827	·4630	7·148	·4815	7·494	·5000	7·864	·5185	8·259	23
24	·4630	7·420	·4815	7·753	·5000	8·111	·5185	8·494	·5370	8·901	24
25	·4815	8·037	·5000	8·383	·5185	8·573	·5370	9·148	·5556	9·568	25
26	·5000	8·679	·5185	9·037	·5370	9·420	·5556	9·827	·5741	10·259	26
27	·5185	9·346	·5370	9·716	·5556	10·111	·5741	10·531	·5926	10·975	27
28	·5370	10·037	·5556	10·420	·5741	10·827	·5926	11·259	·6111	11·716	28
29	·5556	10·753	·5741	11·148	·5926	11·568	·6111	12·012	·6296	12·481	29
30	·5741	11·494	·5926	11·901	·6111	12·333	·6296	12·790	·6481	13·272	30
31	·5926	12·259	·6111	12·679	·6296	13·123	·6481	13·593	·6667	14·086	31
32	·6111	13·049	·6296	13·481	·6481	13·938	·6667	14·420	·6852	14·926	32
33	·6296	13·864	·6481	14·309	·6667	14·778	·6852	15·272	·7037	15·790	33
34	·6481	14·704	·6667	15·160	·6852	15·642	·7037	16·148	·7222	16·679	34
35	·6667	15·568	·6852	16·037	·7037	16·531	·7222	17·049	·7407	17·593	35
36	·6852	16·457	·7037	16·938	·7222	17·444	·7407	17·975	·7593	18·531	36
37	·7037	17·370	·7222	17·864	·7407	18·383	·7593	18·926	·7778	19·494	37
38	·7222	18·309	·7407	18·815	·7593	19·346	·7778	19·901	·7963	20·481	38
39	·7407	19·272	·7593	19·790	·7778	20·333	·7963	20·901	·8148	21·494	39
40	·7593	20·259	·7778	20·790	·7963	21·346	·8148	21·926	·8333	22·531	40
41	·7778	21·272	·7963	21·815	·8148	22·383	·8333	22·975	·8519	23·593	41
42	·7963	22·309	·8148	22·864	·8333	23·444	·8519	24·049	·8704	24·679	42
43	·8148	23·370	·8333	23·938	·8519	24·531	·8704	25·148	·8889	25·790	43
44	·8333	24·457	·8519	25·037	·8704	25·642	·8889	26·272	·9074	26·926	44
45	·8519	25·568	·8704	26·160	·8889	26·778	·9074	27·420	·9259	28·086	45
46	·8704	26·704	·8889	27·309	·9074	27·938	·9259	28·593	·9444	29·272	46
47	·8889	27·864	·9074	28·481	·9259	29·123	·9444	29·790	·9630	30·481	47
48	·9074	29·049	·9259	29·679	·9444	30·333	·9630	31·012	·9815	31·716	48
49	·9259	30·259	·9444	30·901	·9630	31·568	·9815	32·259	1·0000	32·975	49
50	·9444	31·494	·9630	32·148	·9815	32·827	1·0000	33·531	1·0185	34·259	50
	1		2		3		4		5		

Feet.	6		7		8		9		10		Feet.
	Mult.	Add.	Mult.	Add.	Mult.	Add.	Mult.	Add.	Mult.	Add.	
0	·1111	0·444	·1296	0·605	·1481	0·790	·1667	1·000	·1852	1·235	0
1	·1296	0·531	·1481	0·704	·1667	0·901	·1852	1·123	·2037	1·370	1
2	·1481	0·642	·1667	0·827	·1852	1·037	·2037	1·272	·2222	1·531	2
3	·1667	0·778	·1852	0·975	·2037	1·198	·2222	1·444	·2407	1·716	3
4	·1852	0·938	·2037	1·148	·2222	1·383	·2407	1·642	·2593	1·926	4
5	·2037	1·123	·2222	1·346	·2407	1·593	·2593	1·864	·2778	2·160	5
6	·2222	1·333	·2407	1·568	·2593	1·827	·2778	2·111	·2963	2·420	6
7	·2407	1·568	·2593	1·815	·2778	2·086	·2963	2·383	·3148	2·704	7
8	·2593	1·827	·2778	2·086	·2963	2·370	·3148	2·679	·3333	3·012	8
9	·2778	2·111	·2963	2·383	·3148	2·679	·3333	3·000	·3519	3·346	9
10	·2963	2·420	·3148	2·704	·3333	3·012	·3519	3·346	·3704	3·704	10
11	·3148	2·753	·3333	3·049	·3519	3·370	·3704	3·716	·3889	4·086	11
12	·3333	3·111	·3519	3·420	·3704	3·553	·3889	4·111	·4074	4·494	12
13	·3519	3·494	·3704	3·815	·3889	4·160	·4074	4·531	·4259	4·926	13
14	·3704	3·901	·3889	4·235	·4074	4·593	·4259	4·975	·4444	5·323	14
15	·3889	4·333	·4074	4·679	·4259	5·049	·4444	5·444	·4630	5·864	15
16	·4074	4·790	·4259	5·148	·4444	5·531	·4630	5·938	·4815	6·370	16
17	·4259	5·272	·4444	5·642	·4630	6·037	·4815	6·457	·5000	6·901	17
18	·4444	5·778	·4630	6·160	·4815	6·568	·5000	7·000	·5185	7·457	18
19	·4630	6·309	·4815	6·704	·5000	7·123	·5185	7·568	·5370	8·037	19
20	·4815	6·864	·5000	7·272	·5185	7·704	·5370	8·160	·5556	8·642	20
21	·5000	7·444	·5185	7·864	·5370	8·309	·5556	8·778	·5741	9·272	21
22	·5185	8·049	·5370	8·481	·5556	8·938	·5741	9·420	·5926	9·926	22
23	·5370	8·679	·5556	9·123	·5741	9·593	·5926	10·086	·6111	10·605	23
24	·5556	9·333	·5741	9·790	·5926	10·272	·6111	10·778	·6296	11·309	24
25	·5741	10·012	·5926	10·491	·6111	10·975	·6296	11·494	·6481	12·037	25
26	·5926	10·716	·6111	11·198	·6296	11·704	·6481	12·235	·6667	12·790	26
27	·6111	11·444	·6296	11·938	·6481	12·457	·6667	13·000	·6852	13·568	27
28	·6296	12·198	·6481	12·704	·6667	13·235	·6852	13·790	·7037	14·370	28
29	·6481	12·975	·6667	13·494	·6852	14·037	·7037	14·605	·7222	15·198	29
30	·6667	13·778	·6852	14·309	·7037	14·864	·7222	15·444	·7407	16·049	30
31	·6852	14·605	·7037	15·148	·7222	15·716	·7407	16·309	·7593	16·926	31
32	·7037	15·457	·7222	16·012	·7407	16·593	·7593	17·198	·7778	17·827	32
33	·7222	16·333	·7407	16·901	·7593	17·494	·7778	18·111	·7963	18·753	33
34	·7407	17·235	·7593	17·815	·7778	18·420	·7963	19·049	·8148	19·704	34
35	·7593	18·160	·7778	18·753	·7963	19·370	·8148	20·012	·8333	20·679	35
36	·7778	19·111	·7963	19·716	·8148	20·346	·8333	21·000	·8519	21·670	36
37	·7963	20·086	·8148	20·704	·8333	21·346	·8519	22·012	·8704	22·704	37
38	·8148	21·086	·8333	21·716	·8519	22·370	·8704	23·049	·8889	23·753	38
39	·8333	22·111	·8519	22·753	·8704	23·420	·8889	24·111	·9074	24·827	39
40	·8519	23·160	·8704	23·815	·8889	24·494	·9074	25·198	·9259	25·926	40
41	·8704	24·235	·8889	24·901	·9074	25·593	·9259	26·309	·9444	27·049	41
42	·8889	25·333	·9074	26·012	·9259	26·716	·9444	27·444	·9630	28·198	42
43	·9074	26·457	·9259	27·148	·9444	27·864	·9630	28·605	·9815	29·370	43
44	·9259	27·605	·9444	28·309	·9630	29·037	·9815	29·790	1·0000	30·568	44
45	·9444	28·778	·9630	29·494	·9815	30·235	1·0000	31·000	1·0185	31·790	45
46	·9630	29·975	·9815	30·704	1·0000	31·457	1·0185	32·235	1·0370	33·037	46
47	·9815	31·198	1·0000	31·938	1·0185	32·704	1·0370	33·494	1·0556	34·309	47
48	1·0000	32·444	1·0185	33·198	1·0370	33·975	1·0556	34·778	1·0741	35·605	48
49	1·0185	33·716	1·0370	34·481	1·0556	35·272	1·0741	36·086	1·0926	36·926	49
50	1·0370	35·012	1·0556	35·790	1·0741	36·593	1·0926	37·420	1·1111	38·272	50
	6		7		8		9		10		

Feet.	11		12		13		14		15		Feet.
	Mult.	Add.	Mult.	Add.	Mult.	Add.	Mult.	Add.	Mult.	Add.	
0	·2037	1·494	·2222	1·778	·2407	2·086	·2593	2·420	·2778	2·778	0
1	·2222	1·642	·2407	1·938	·2593	2·259	·2778	2·605	·2963	2·975	1
2	·2407	1·815	·2593	2·123	·2778	2·457	·2963	2·815	·3148	3·198	2
3	·2593	2·012	·2778	2·333	·2963	2·679	·3148	3·049	·3333	3·444	3
4	·2778	2·235	·2963	2·568	·3148	2·926	·3333	3·309	·3519	3·716	4
5	·2963	2·481	·3148	2·827	·3333	3·198	·3519	3·593	·3704	4·012	5
6	·3148	2·753	·3333	3·111	·3519	3·494	·3704	3·901	·3889	4·333	6
7	·3333	3·049	·3519	3·420	·3704	3·815	·3889	4·235	·4074	4·679	7
8	·3519	3·370	·3704	3·753	·3889	4·161	·4074	4·593	·4259	5·049	8
9	·3704	3·716	·3889	4·111	·4074	4·531	·4259	4·975	·4444	5·444	9
10	·3889	4·086	·4074	4·494	·4259	4·926	·4444	5·383	·4630	5·864	10
11	·4074	4·481	·4259	4·901	·4444	5·346	·4630	5·815	·4815	6·309	11
12	·4259	4·901	·4444	5·333	·4630	5·790	·4815	6·272	·5000	6·778	12
13	·4444	5·346	·4630	5·790	·4815	6·259	·5000	6·753	·5185	7·272	13
14	·4630	5·815	·4815	6·272	·5000	6·753	·5185	7·259	·5370	7·799	14
15	·4815	6·309	·5000	6·778	·5185	7·272	·5370	7·790	·5556	8·333	15
16	·5000	6·827	·5185	7·309	·5370	7·815	·5556	8·346	·5741	8·901	16
17	·5185	7·370	·5370	7·864	·5556	8·383	·5741	8·926	·5926	9·494	17
18	·5370	7·938	·5556	8·444	·5741	8·975	·5936	9·531	·6111	10·111	18
19	·5556	8·531	·5741	9·049	·5926	9·593	·6111	10·160	·6296	10·753	19
20	·5741	9·148	·5926	9·679	·6111	10·235	·6296	10·815	·6481	11·420	20
21	·5926	9·790	·6111	10·333	·6296	10·901	·6481	11·494	·6667	12·111	21
22	·6111	10·457	·6296	11·012	·6481	11·593	·6667	12·198	·6852	12·827	22
23	·6296	11·148	·6481	11·716	·6667	12·309	·6852	12·926	·7037	13·568	23
24	·6481	11·864	·6667	12·444	·6852	13·049	·7037	13·679	·7222	14·333	24
25	·6667	12·695	·6852	13·198	·7037	13·815	·7222	14·457	·7407	15·123	25
26	·6852	13·370	·7037	13·975	·7222	14·605	·7407	15·259	·7593	15·938	26
27	·7037	14·160	·7222	14·778	·7407	15·420	·7593	16·086	·7778	16·778	27
28	·7222	14·975	·7407	15·605	·7593	16·259	·7778	16·938	·7963	17·642	28
29	·7407	15·815	·7593	16·457	·7778	17·123	·7963	17·815	·8148	18·531	29
30	·7593	16·679	·7778	17·333	·7963	18·012	·8148	18·716	·8333	19·444	30
31	·7778	17·568	·7963	18·235	·8148	18·926	·8333	19·642	·8519	20·383	31
32	·7963	18·481	·8148	19·160	·8333	19·864	·8519	20·593	·8704	21·346	32
33	·8148	19·420	·8333	20·111	·8519	20·827	·8704	21·568	·8889	22·333	33
34	·8333	20·383	·8519	21·086	·8704	21·815	·8889	22·568	·9074	23·346	34
35	·8519	21·370	·8704	22·086	·8889	22·827	·9074	23·593	·9259	24·383	35
36	·8704	22·383	·8889	23·111	·9074	23·864	·9259	24·642	·9444	25·444	36
37	·8889	23·420	·9074	24·160	·9259	24·926	·9444	25·716	·9630	26·531	37
38	·9074	24·481	·9259	25·235	·9444	26·012	·9630	26·815	·9815	27·642	38
39	·9259	25·568	·9444	26·333	·9630	27·123	·9815	27·938	1·0000	28·778	39
40	·9444	26·679	·9630	27·457	·9815	28·259	1·0000	29·086	1·0185	29·938	40
41	·9630	27·815	·9815	28·605	1·0000	29·429	1·0185	30·259	1·0370	31·123	41
42	·9815	28·975	1·0000	29·778	1·0185	30·605	1·0370	31·457	1·0556	32·333	42
43	1·0000	30·160	1·0185	30·975	1·0370	31·815	1·0556	32·679	1·0741	33·568	43
44	1·0185	31·370	1·0370	32·198	1·0556	33·049	1·0741	33·926	1·0926	34·827	44
45	1·0370	32·605	1·0556	33·444	1·0741	34·309	1·0926	35·198	1·1111	36·111	45
46	1·0556	33·864	1·0741	34·716	1·0926	35·593	1·1111	36·494	1·1296	37·420	46
47	1·0741	35·148	1·0926	36·012	1·1111	36·901	1·1296	37·815	1·1481	38·753	47
48	1·0926	36·457	1·1111	37·333	1·1296	38·235	1·1481	39·160	1·1667	40·111	48
49	1·1111	37·790	1·1296	38·679	1·1481	39·593	1·1667	40·531	1·1852	41·494	49
50	1·1296	39·148	1·1481	40·049	1·1667	40·975	1·1852	41·926	1·2047	42·901	50
	11		12		13		14		15		

Feet.	16		17		18		19		20		Feet.
	Mult.	Add.	Mult.	Add.	Mult.	Add.	Mult.	Add.	Mult.	Add.	
0	·2963	3·160	·3148	3·568	·3333	4·000	·3519	4·457	·3704	4·938	0
1	·3148	3·370	·3333	3·790	·3519	4·234	·3704	4·704	·3889	5·198	1
2	·3333	3·605	·3519	4·037	·3704	4·494	·3889	4·975	·4074	5·481	2
3	·3519	3·864	·3704	4·309	·3889	4·778	·4074	5·272	·4259	5·790	3
4	·3704	4·148	·3889	4·605	·4074	5·086	·4259	5·593	·4444	6·123	4
5	·3889	4·457	·4074	4·926	·4259	5·420	·4444	5·938	·4630	6·481	5
6	·4074	4·790	·4259	5·272	·4444	5·778	·4630	6·309	·4815	6·864	6
7	·4259	5·148	·4444	5·642	·4630	6·160	·4815	6·704	·5000	7·272	7
8	·4444	5·531	·4630	6·037	·4815	6·568	·5000	7·123	·5185	7·704	8
9	·4630	5·938	·4815	6·457	·5000	7·000	·5185	7·568	·5370	8·160	9
10	·4815	6·370	·5000	6·901	·5185	7·457	·5370	8·037	·5556	8·642	10
11	·5000	6·827	·5185	7·370	·5370	7·938	·5556	8·531	·5741	9·148	11
12	·5185	7·309	·5370	7·864	·5556	8·444	·5741	9·049	·5926	9·679	12
13	·5370	7·815	·5556	8·383	·5741	8·975	·5926	9·593	·6111	10·235	13
14	·5556	8·346	·5741	8·926	·5926	9·531	·6111	10·160	·6296	10·815	14
15	·5741	8·901	·5926	9·494	·6111	10·111	·6296	10·753	·6481	11·420	15
16	·5926	9·481	·6111	10·086	·6296	10·716	·6481	11·370	·6667	12·049	16
17	·6111	10·086	·6296	10·704	·6481	11·346	·6667	12·012	·6852	12·704	17
18	·6296	10·716	·6481	11·346	·6667	12·000	·6852	12·679	·7037	13·383	18
19	·6481	11·370	·6667	12·012	·6852	12·679	·7037	13·370	·7222	14·086	19
20	·6667	12·049	·6852	12·704	·7037	13·383	·7222	14·086	·7407	14·815	20
21	·6852	12·753	·7037	13·420	·7222	14·111	·7407	14·827	·7593	15·568	21
22	·7037	13·481	·7222	14·160	·7407	14·864	·7593	15·593	·7778	16·346	22
23	·7222	14·235	·7407	14·926	·7593	15·642	·7778	16·383	·7963	17·148	23
24	·7407	15·012	·7593	15·716	·7778	16·444	·7963	17·198	·8148	17·975	24
25	·7593	15·815	·7778	16·531	·7963	17·272	·8148	18·037	·8333	18·827	25
26	·7778	16·642	·7963	17·370	·8148	18·123	·8333	18·901	·8519	19·704	26
27	·7963	17·494	·8148	18·235	·8333	19·000	·8519	19·790	·8704	20·605	27
28	·8148	18·370	·8333	19·123	·8519	19·901	·8704	20·704	·8889	21·531	28
29	·8333	19·272	·8519	20·037	·8704	20·827	·8889	21·642	·9074	22·481	29
30	·8519	20·198	·8704	20·975	·8889	21·778	·9074	22·605	·9259	23·457	30
31	·8704	21·148	·8889	21·938	·9074	22·753	·9259	23·593	·9444	24·457	31
32	·8889	22·123	·9074	22·926	·9259	23·753	·9444	24·605	·9630	25·481	32
33	·9074	23·123	·9259	23·938	·9444	24·778	·9630	25·642	·9815	26·531	33
34	·9259	24·148	·9444	24·975	·9630	25·827	·9815	26·704	·1·0000	27·605	34
35	·9444	25·198	·9630	26·037	·9815	26·901	1·0000	27·790	1·0185	28·704	35
36	·9630	26·272	·9815	27·123	1·0000	28·000	1·0185	28·901	1·0370	29·827	36
37	·9815	27·370	1·0000	28·235	1·0185	29·123	1·0370	30·037	1·0556	30·975	37
38	1·0000	28·494	1·0185	29·370	1·0370	30·272	1·0556	31·198	1·0741	32·148	38
39	1·0185	29·642	1·0370	30·531	1·0556	31·444	1·0741	32·383	1·0926	33·346	39
40	1·0370	30·815	1·0556	31·716	1·0741	32·642	1·0926	33·593	1·1111	34·568	40
41	1·0556	32·012	1·0741	32·926	1·0926	33·864	1·1111	34·827	1·1296	35·815	41
42	1·0741	33·235	1·0926	34·160	1·1111	35·111	1·1296	36·086	1·1481	37·086	42
43	1·0926	34·481	1·1111	35·420	1·1296	36·383	1·1481	37·370	1·1667	38·383	43
44	1·1111	35·753	1·1296	36·704	1·1481	37·679	1·1667	38·679	1·1852	39·704	44
45	1·1296	37·049	1·1481	38·012	1·1667	39·000	1·1852	40·012	1·2047	41·049	45
46	1·1481	38·370	1·1667	39·346	1·1852	40·346	1·2047	41·370	1·2222	42·420	46
47	1·1667	39·716	1·1852	40·704	1·2047	41·716	1·2222	42·753	1·2407	43·815	47
48	1·1852	41·086	1·2047	42·086	1·2222	43·111	1·2407	44·160	1·2593	45·235	48
49	1·2047	42·481	1·2222	43·494	1·2407	44·531	1·2593	45·593	1·2778	46·679	49
50	1·2222	43·901	1·2407	44·926	1·2593	45·975	1·2778	47·049	1·2963	48·148	50
	16		17		18		19		20		

Feet.	21		22		23		24		25		Feet.
	Mult.	Add.	Mult.	Add.	Mult.	Add.	Mult.	Add.	Mult.	Add.	
0	3889	5444	4074	5975	4259	6531	4444	7111	4630	7716	0
1	4074	5716	4259	6259	4444	6827	4630	7420	4815	8037	1
2	4259	6012	4444	6568	4630	7148	4815	7753	5000	8383	2
3	4444	6333	4630	6901	4815	7494	5000	8111	5185	8753	3
4	4630	6679	4815	7259	5000	7864	5185	8494	5370	9148	4
5	4815	7049	5000	7642	5185	8259	5370	8901	5556	9568	5
6	5000	7444	5185	8049	5370	8679	5556	9333	5741	10012	6
7	5185	7864	5370	8481	5556	9123	5741	9790	5926	10481	7
8	5370	8309	5556	8938	5741	9593	5926	10272	6111	10975	8
9	5556	8778	5741	9420	5926	10086	6111	10778	6296	11494	9
10	5741	9272	5926	9926	6111	10605	6296	11309	6481	12037	10
11	5926	9790	6111	10457	6296	11148	6481	11864	6667	12605	11
12	6111	10333	6296	11012	6481	11716	6667	12444	6852	13198	12
13	6296	10901	6481	11593	6667	12309	6852	13049	7037	13815	13
14	6481	11494	6667	12198	6852	12926	7037	13679	7222	14457	14
15	6667	12111	6852	12827	7037	13568	7222	14333	7407	15123	15
16	6852	12753	7037	13481	7222	14235	7407	15012	7593	15815	16
17	7037	13420	7222	14160	7407	14926	7593	15716	7778	16531	17
18	7222	14111	7407	14864	7593	15642	7778	16444	7963	17272	18
19	7407	14827	7593	15593	7778	16383	7963	17198	8148	18037	19
20	7593	15568	7778	16346	7963	17148	8148	17975	8333	18827	20
21	7778	16333	7963	17123	8148	17938	8333	18778	8519	19642	21
22	7963	17123	8148	17926	8333	18753	8519	19605	8704	20481	22
23	8148	17938	8333	18753	8519	19593	8704	20457	8889	21346	23
24	8333	18778	8519	19605	8704	20457	8889	21333	9074	22235	24
25	8519	19642	8704	20481	8889	21346	9074	22235	9259	23148	25
26	8704	20531	8889	21383	9074	22259	9259	23160	9444	24086	26
27	8889	21444	9074	22309	9259	23198	9444	24111	9630	25049	27
28	9074	22383	9259	23259	9444	24160	9630	25086	9815	26037	28
29	9259	23346	9444	24235	9630	25148	9815	26086	10000	27049	29
30	9444	24333	9630	25235	9815	26160	10000	27111	10185	28086	30
31	9630	25346	9815	26259	10000	27198	10185	28160	10370	29148	31
32	9815	26383	10000	27309	10185	28259	10370	29235	10556	30235	32
33	10000	27444	10185	28383	10370	29346	10556	30333	10741	31346	33
34	10185	28531	10370	29481	10556	30457	10741	31457	10926	32481	34
35	10370	29642	10556	30605	10741	31593	10926	32605	11111	33642	35
36	10556	30778	10741	31753	10926	32753	11111	33778	11296	34827	36
37	10741	31938	10926	32926	11111	33938	11296	34975	11481	36037	37
38	10926	33123	11111	34123	11296	35148	11481	36198	11667	37272	38
39	11111	34333	11296	35346	11481	36383	11667	37444	11852	38531	39
40	11296	35568	11481	36593	11667	37642	11852	38716	12047	39815	40
41	11481	36827	11667	37864	11852	38926	12047	40012	12222	41123	41
42	11667	38111	11852	39160	12047	40235	12222	41333	12407	42457	42
43	11852	39420	12047	40481	12222	41568	12407	42679	12593	43815	43
44	12047	40753	12222	41827	12407	42926	12593	44049	12778	45198	44
45	12222	42111	12407	43198	12593	44309	12778	45444	12963	46605	45
46	12407	43494	12593	44593	12778	45716	12963	46864	13148	48037	46
47	12593	44901	12778	46012	12963	47148	13148	48309	13333	49494	47
48	12778	46333	12963	47457	13148	48605	13333	49778	13519	50975	48
49	12963	47790	13148	48926	13333	50086	13519	51272	13704	52481	49
50	13148	49272	13333	50420	13519	51593	13704	52790	13889	54012	50
	21		22		23		24		25		

TABLE II.—THIRD SERIES. Base 1.—Slopes $1\frac{1}{2}$ to 1.

Feet.	1		2		3		4		5		Feet.
	Mult.	Add.	Mult.	Add.	Mult.	Add.	Mult.	Add.	Mult.	Add.	
0	·0185	·019	·0370	·074	·0556	·167	·0741	·296	·0926	·463	0
1	·0370	·056	·0556	·130	·0741	·241	·0926	·389	·1111	·574	1
2	·0556	·130	·0741	·222	·0926	·352	·1111	·519	·1296	·722	2
3	·0741	·241	·0926	·352	·1111	·500	·1296	·685	·1481	·907	3
4	·0926	·389	·1111	·519	·1296	·685	·1481	·889	·1667	1·130	4
5	·1111	·574	·1296	·722	·1481	·907	·1667	1·130	·1852	1·389	5
6	·1296	·796	·1481	·963	·1667	1·167	·1852	1·407	·2037	1·685	6
7	·1481	1·056	·1667	1·241	·1852	1·463	·2037	1·722	·2222	2·019	7
8	·1667	1·352	·1852	1·556	·2037	1·796	·2222	2·074	·2407	2·389	8
9	·1852	1·685	·2037	1·907	·2222	2·167	·2407	2·463	·2593	2·796	9
10	·2037	2·056	·2222	2·296	·2407	2·574	·2593	2·889	·2778	3·241	10
11	·2222	2·463	·2407	2·722	·2593	3·019	·2778	3·352	·2963	3·722	11
12	·2407	2·907	·2593	3·185	·2778	3·500	·2963	3·852	·3148	4·241	12
13	·2593	3·389	·2778	3·685	·2963	4·019	·3148	4·389	·3333	4·796	13
14	·2778	3·907	·2963	4·222	·3148	4·574	·3333	4·963	·3519	5·389	14
15	·2963	4·463	·3148	4·796	·3333	5·167	·3519	5·574	·3704	6·019	15
16	·3148	5·056	·3333	5·407	·3519	5·796	·3704	6·222	·3889	6·685	16
17	·3333	5·685	·3519	6·056	·3704	6·463	·3889	6·907	·4074	7·389	17
18	·3519	6·352	·3704	6·741	·3889	7·167	·4074	7·630	·4259	8·130	18
19	·3704	7·056	·3889	7·463	·4074	7·907	·4259	8·389	·4444	8·907	19
20	·3889	7·796	·4074	8·222	·4259	8·685	·4444	9·185	·4630	9·722	20
21	·4074	8·574	·4259	9·019	·4444	9·500	·4630	10·019	·4815	10·574	21
22	·4259	9·389	·4444	9·852	·4630	10·352	·4815	10·889	·5000	11·463	22
23	·4444	10·241	·4630	10·722	·4815	11·241	·5000	11·796	·5185	12·389	23
24	·4630	11·130	·4815	11·630	·5000	12·167	·5185	12·741	·5370	13·352	24
25	·4815	12·056	·5000	12·574	·5185	13·130	·5370	13·722	·5556	14·352	25
26	·5000	13·019	·5185	13·556	·5370	14·130	·5556	14·741	·5741	15·389	26
27	·5185	14·019	·5370	14·574	·5556	15·167	·5741	15·796	·5926	16·463	27
28	·5370	15·056	·5556	15·630	·5741	16·241	·5926	16·889	·6111	17·574	28
29	·5556	16·130	·5741	16·722	·5926	17·352	·6111	18·019	·6296	18·722	29
30	·5741	17·241	·5926	17·852	·6111	18·500	·6296	19·185	·6481	19·907	30
31	·5926	18·389	·6111	19·019	·6296	19·685	·6481	20·389	·6667	21·130	31
32	·6111	19·574	·6296	20·222	·6481	20·907	·6667	21·630	·6852	22·389	32
33	·6296	20·796	·6481	21·463	·6667	22·167	·6852	22·907	·7037	23·685	33
34	·6481	22·056	·6667	22·741	·6852	23·463	·7037	24·222	·7222	25·019	34
35	·6667	23·352	·6852	24·056	·7037	24·796	·7222	25·574	·7407	26·389	35
36	·6852	24·685	·7037	25·407	·7222	26·167	·7407	26·963	·7593	27·796	36
37	·7037	26·056	·7222	26·796	·7407	27·574	·7593	28·389	·7778	29·241	37
38	·7222	27·463	·7407	28·222	·7593	29·019	·7778	29·852	·7963	30·722	38
39	·7407	28·907	·7593	29·685	·7778	30·500	·7963	31·352	·8148	32·241	39
40	·7593	30·389	·7778	31·185	·7963	32·019	·8148	32·889	·8333	33·796	40
41	·7778	31·907	·7963	32·722	·8148	33·574	·8333	34·463	·8519	35·389	41
42	·7963	33·463	·8148	34·296	·8333	35·167	·8519	36·074	·8704	37·019	42
43	·8148	35·056	·8333	35·907	·8519	36·796	·8704	37·722	·8889	38·685	43
44	·8333	36·685	·8519	37·556	·8704	38·463	·8889	39·407	·9074	40·389	44
45	·8519	38·352	·8704	39·241	·8889	40·167	·9074	41·130	·9259	42·130	45
46	·8704	40·056	·8889	40·963	·9074	41·907	·9259	42·889	·9444	43·907	46
47	·8889	41·796	·9074	42·722	·9259	43·685	·9444	44·685	·9630	45·722	47
48	·9074	43·574	·9259	44·519	·9444	45·500	·9630	46·519	·9815	47·574	48
49	·9259	45·389	·9444	46·352	·9630	47·352	·9815	48·389	1·0000	49·463	49
50	·9444	47·241	·9630	48·222	·9815	49·241	1·0000	50·296	1·0185	51·389	50
	1		2		3		4		5		

Feet.	6		7		8		9		10		Feet.
	Mult.	Add.	Mult.	Add.	Mult.	Add.	Mult.	Add.	Mult.	Add.	
0	·1111	·667	·1296	·907	·1481	1·185	·1667	1·500	·1852	1·852	0
1	·1296	·793	·1481	1·056	·1667	1·352	·1852	1·685	·2037	2·056	1
2	·1481	·963	·1667	1·241	·1852	1·556	·2037	1·907	·2222	2·296	2
3	·1667	1·167	·1852	1·463	·2037	1·796	·2222	2·167	·2407	2·574	3
4	·1852	1·407	·2037	1·722	·2222	2·074	·2407	2·463	·2593	2·889	4
5	·2037	1·685	·2222	2·019	·2407	2·389	·2593	2·796	·2778	3·241	5
6	·2222	2·000	·2407	2·332	·2593	2·741	·2778	3·167	·2963	3·630	6
7	·2407	2·352	·2593	2·722	·2778	3·130	·2963	3·574	·3148	4·056	7
8	·2593	2·741	·2778	3·130	·2963	3·556	·3148	4·019	·3333	4·519	8
9	·2778	3·167	·2963	3·574	·3148	4·019	·3333	4·500	·3519	5·019	9
10	·2963	3·630	·3148	4·056	·3333	4·519	·3519	5·019	·3704	5·556	10
11	·3148	4·130	·3333	4·574	·3519	5·056	·3704	5·574	·3889	6·130	11
12	·3333	4·667	·3519	5·130	·3704	5·630	·3889	6·167	·4074	6·741	12
13	·3519	5·241	·3704	5·722	·3889	6·241	·4074	6·793	·4259	7·389	13
14	·3704	5·852	·3889	6·352	·4074	6·889	·4259	7·463	·4444	8·074	14
15	·3889	6·500	·4074	7·019	·4259	7·574	·4444	8·167	·4630	8·796	15
16	·4074	7·185	·4259	7·722	·4444	8·296	·4630	8·907	·4815	9·556	16
17	·4259	7·907	·4444	8·433	·4630	9·056	·4815	9·685	·5000	10·352	17
18	·4444	8·667	·4630	9·241	·4815	9·852	·5000	10·500	·5185	11·185	18
19	·4630	9·463	·4815	10·056	·5000	10·685	·5185	11·352	·5370	12·056	19
20	·4815	10·296	·5000	10·907	·5185	11·556	·5370	12·241	·5556	12·963	20
21	·5000	11·167	·5185	11·796	·5370	12·463	·5556	13·167	·5741	13·907	21
22	·5185	12·074	·5370	12·722	·5556	13·407	·5741	14·130	·5926	14·889	22
23	·5370	13·019	·5556	13·685	·5741	14·389	·5926	15·130	·6111	15·907	23
24	·5556	14·009	·5741	14·685	·5926	15·407	·6111	16·167	·6296	16·963	24
25	·5741	15·019	·5926	15·722	·6111	16·463	·6296	17·241	·6481	18·056	25
26	·5926	16·074	·6111	16·796	·6296	17·556	·6481	18·352	·6667	19·185	26
27	·6111	17·167	·6296	17·907	·6481	18·685	·6667	19·500	·6852	20·352	27
28	·6296	18·296	·6481	19·056	·6667	19·852	·6852	20·685	·7037	21·556	28
29	·6481	19·463	·6667	20·241	·6852	21·056	·7037	21·907	·7222	22·796	29
30	·6667	20·667	·6852	21·463	·7037	22·296	·7222	23·167	·7407	24·074	30
31	·6852	21·907	·7037	22·722	·7222	23·574	·7407	24·463	·7593	25·389	31
32	·7037	23·185	·7222	24·019	·7407	24·889	·7593	25·796	·7778	26·741	32
33	·7222	24·500	·7407	25·352	·7593	26·241	·7778	27·167	·7963	28·130	33
34	·7407	25·852	·7593	26·722	·7778	27·630	·7963	28·574	·8148	29·556	34
35	·7593	27·241	·7778	28·130	·7963	29·056	·8148	30·019	·8333	31·019	35
36	·7778	28·667	·7963	29·574	·8148	30·519	·8333	31·500	·8519	32·519	36
37	·7963	30·130	·8148	31·056	·8333	32·019	·8519	33·019	·8704	34·056	37
38	·8148	31·630	·8333	32·574	·8519	33·556	·8704	34·574	·8889	35·630	38
39	·8333	33·167	·8519	34·130	·8704	35·130	·8889	36·167	·9074	37·241	39
40	·8519	34·741	·8704	35·722	·8889	36·741	·9074	37·796	·9259	38·889	40
41	·8704	36·352	·8889	37·352	·9074	38·389	·9259	39·463	·9444	40·574	41
42	·8889	38·000	·9074	39·019	·9259	40·074	·9444	41·167	·9630	42·296	42
43	·9074	39·685	·9259	40·722	·9444	41·796	·9630	42·907	·9815	44·056	43
44	·9259	41·407	·9444	42·463	·9630	43·556	·9815	44·685	1·0000	45·852	44
45	·9444	43·167	·9630	44·241	·9815	45·352	1·0000	46·500	1·0185	47·685	45
46	·9630	44·963	·9815	46·056	1·0000	47·185	1·0185	48·352	1·0370	49·556	46
47	·9815	46·796	1·0000	47·907	1·0185	49·056	1·0370	50·241	1·0556	51·463	47
48	1·0000	48·667	1·0185	49·796	1·0370	50·963	1·0556	52·167	1·0741	53·407	48
49	1·0185	50·574	1·0370	51·722	1·0556	52·907	1·0741	54·130	1·0926	55·389	49
50	1·0370	52·519	1·0556	53·685	1·0741	54·889	1·0926	56·130	1·1111	57·407	50
	6		7		8		9		10		

Feet.	11		12		13		14		15		Feet.
	Mult.	Add.	Mult.	Add.	Mult.	Add.	Mult.	Add.	Mult.	Add.	
0	·2037	2 241	·2222	2 667	·2407	3 130	·2593	3 630	·2778	4 167	0
1	·2222	2 463	·2407	2 907	·2593	3 389	·2778	3 907	·2963	4 463	1
2	·2407	2 722	·2593	3 185	·2778	3 685	·2963	4 222	·3148	4 796	2
3	·2593	3 019	·2778	3 500	·2963	4 019	·3148	4 574	·3333	5 167	3
4	·2778	3 352	·2963	3 852	·3148	4 389	·3333	4 963	·3519	5 574	4
5	·2963	3 722	·3148	4 241	·3333	4 796	·3519	5 389	·3704	6 019	5
6	·3148	4 130	·3333	4 667	·3519	5 241	·3704	5 852	·3889	6 500	6
7	·3333	4 574	·3519	5 130	·3704	5 722	·3889	6 352	·4074	7 019	7
8	·3519	5 056	·3704	5 630	·3889	6 241	·4074	6 889	·4259	7 574	8
9	·3704	5 574	·3889	6 167	·4074	6 796	·4259	7 463	·4444	8 167	9
10	·3889	6 130	·4074	6 741	·4259	7 389	·4444	8 074	·4630	8 796	10
11	·4074	6 722	·4259	7 352	·4444	8 019	·4630	8 722	·4815	9 463	11
12	·4259	7 352	·4444	8 000	·4630	8 685	·4815	9 407	·5000	10 167	12
13	·4444	8 019	·4630	8 685	·4815	9 389	·5000	10 130	·5185	10 937	13
14	·4630	8 722	·4815	9 407	·5000	10 130	·5185	10 889	·5370	11 685	14
15	·4815	9 463	·5000	10 167	·5185	10 907	·5370	11 685	·5556	12 500	15
16	·5000	10 241	·5185	10 963	·5370	11 722	·5556	12 519	·5741	13 352	16
17	·5185	11 056	·5370	11 796	·5556	12 574	·5741	13 389	·5926	14 241	17
18	·5370	11 907	·5556	12 667	·5741	13 463	·5926	14 296	·6111	15 167	18
19	·5556	12 796	·5741	13 574	·5926	14 389	·6111	15 241	·6296	16 130	19
20	·5741	13 722	·5926	14 519	·6111	15 352	·6296	16 222	·6481	17 130	20
21	·5926	14 685	·6111	15 590	·6296	16 352	·6481	17 241	·6667	18 167	21
22	·6111	15 685	·6296	16 519	·6481	17 389	·6667	18 296	·6852	19 241	22
23	·6296	16 722	·6481	17 574	·6667	18 463	·6852	19 389	·7037	20 352	23
24	·6481	17 796	·6667	18 667	·6852	19 574	·7037	20 519	·7222	21 500	24
25	·6667	18 907	·6852	19 796	·7037	20 722	·7222	21 685	·7407	22 685	25
26	·6852	20 056	·7037	20 963	·7222	21 907	·7407	22 889	·7593	23 907	26
27	·7037	21 241	·7222	22 167	·7407	23 130	·7593	24 130	·7778	25 167	27
28	·7222	22 463	·7407	23 417	·7593	24 389	·7778	25 407	·7963	26 463	28
29	·7407	23 722	·7593	24 685	·7778	25 685	·7963	26 722	·8148	27 796	29
30	·7593	25 019	·7778	26 000	·7963	27 019	·8148	28 074	·8333	29 167	30
31	·7778	26 352	·7963	27 352	·8148	28 389	·8333	29 463	·8519	30 574	31
32	·7963	27 722	·8148	28 741	·8333	29 796	·8519	30 889	·8704	32 019	32
33	·8148	29 130	·8333	30 167	·8519	31 241	·8704	32 352	·8889	33 500	33
34	·8333	30 574	·8519	31 630	·8704	32 722	·8889	33 852	·9074	35 019	34
35	·8519	32 056	·8704	33 130	·8889	34 241	·9074	35 389	·9259	36 574	35
36	·8704	33 574	·8889	34 667	·9074	35 796	·9259	36 963	·9444	38 167	36
37	·8889	35 130	·9074	36 241	·9259	37 389	·9444	38 574	·9630	39 796	37
38	·9074	36 722	·9259	37 852	·9444	39 019	·9630	40 222	·9815	41 463	38
39	·9259	38 352	·9444	39 500	·9630	40 685	·9815	41 907	1 0000	43 167	39
40	·9444	40 019	·9630	41 185	·9815	42 389	1 0000	43 630	1 0185	44 907	40
41	·9630	41 792	·9815	42 907	1 0000	44 130	1 0185	45 389	1 0370	46 685	41
42	·9815	43 463	1 0000	44 667	1 0185	45 907	1 0370	47 185	1 0556	48 500	42
43	1 0000	45 241	1 0185	46 463	1 0370	47 722	1 0556	49 019	1 0741	50 352	43
44	1 0185	47 056	1 0370	48 246	1 0556	49 574	1 0741	50 889	1 0926	52 241	44
45	1 0370	48 907	1 0556	50 167	1 0741	51 463	1 0926	52 796	1 1111	54 167	45
46	1 0556	50 796	1 0741	52 074	1 0926	53 389	1 1111	54 741	1 1296	56 130	46
47	1 0741	52 722	1 0926	54 019	1 1111	55 352	1 1296	56 722	1 1481	58 130	47
48	1 0926	54 685	1 1111	56 900	1 1296	57 352	1 1481	58 741	1 1667	60 167	48
49	1 1111	56 685	1 1296	58 019	1 1481	59 389	1 1667	60 796	1 1852	62 241	49
50	1 1296	58 722	1 1481	60 074	1 1667	61 463	1 1852	62 889	1 2047	64 352	50
	11		12		13		14		15		

Feet.	16		17		18		19		20		Feet.
	Mult.	Add.	Mult.	Add.	Mult.	Add.	Mult.	Add.	Mult.	Add.	
0	·2963	4·741	·3148	5·352	·3333	6·000	·3519	6·685	·3704	7·407	0
1	·3148	5·056	·3333	5·685	·3519	6·352	·3704	7·056	·3889	7·796	1
2	·3333	5·407	·3519	6·056	·3704	6·741	·3889	7·463	·4074	8·222	2
3	·3519	5·796	·3704	6·463	·3889	7·167	·4074	7·907	·4259	8·685	3
4	·3704	6·222	·3889	6·907	·4074	7·630	·4259	8·389	·4444	9·185	4
5	·3889	6·685	·4074	7·389	·4259	8·130	·4444	8·907	·4630	9·722	5
6	·4074	7·185	·4259	7·907	·4444	8·667	·4630	9·463	·4815	10·296	6
7	·4259	7·722	·4444	8·463	·4630	9·241	·4815	10·056	·5000	10·907	7
8	·4444	8·296	·4630	9·056	·4815	9·852	·5000	10·685	·5185	11·556	8
9	·4630	8·907	·4815	9·685	·5000	10·500	·5185	11·352	·5370	12·241	9
10	·4815	9·556	·5000	10·352	·5185	11·185	·5370	12·056	·5556	12·963	10
11	·5000	10·241	·5185	11·056	·5370	11·907	·5556	12·796	·5741	13·722	11
12	·5185	10·963	·5370	11·796	·5556	12·667	·5741	13·574	·5926	14·519	12
13	·5370	11·722	·5556	12·574	·5741	13·463	·5926	14·389	·6111	15·352	13
14	·5556	12·519	·5741	13·389	·5926	14·296	·6111	15·241	·6296	16·222	14
15	·5741	13·352	·5926	14·241	·6111	15·167	·6296	16·130	·6481	17·130	15
16	·5926	14·222	·6111	15·130	·6296	16·074	·6481	17·056	·6667	18·074	16
17	·6111	15·130	·6296	16·056	·6481	17·019	·6667	18·019	·6852	19·056	17
18	·6296	16·074	·6481	17·019	·6667	18·000	·6852	19·019	·7037	20·074	18
19	·6481	17·056	·6667	18·019	·6852	19·019	·7037	20·056	·7222	21·130	19
20	·6667	18·074	·6852	19·056	·7037	20·074	·7222	21·130	·7407	22·222	20
21	·6852	19·130	·7037	20·130	·7222	21·167	·7407	22·241	·7593	23·352	21
22	·7037	20·222	·7222	21·241	·7407	22·296	·7593	23·389	·7778	24·519	22
23	·7222	21·352	·7407	22·389	·7593	23·463	·7778	24·574	·7963	25·722	23
24	·7407	22·519	·7593	23·574	·7778	24·667	·7963	25·796	·8148	26·963	24
25	·7593	23·722	·7778	24·796	·7963	25·907	·8148	27·056	·8333	28·241	25
26	·7778	24·963	·7963	26·056	·8148	27·185	·8333	28·352	·8519	29·556	26
27	·7963	26·241	·8148	27·352	·8333	28·500	·8519	29·685	·8704	30·907	27
28	·8148	27·556	·8333	28·685	·8519	29·852	·8704	31·056	·8889	32·296	28
29	·8333	28·907	·8519	30·056	·8704	31·241	·8889	32·463	·9074	33·722	29
30	·8519	30·296	·8704	31·463	·8889	32·667	·9074	33·907	·9259	35·185	30
31	·8704	31·722	·8889	32·907	·9074	34·130	·9259	35·389	·9444	36·685	31
32	·8889	33·185	·9074	34·389	·9259	35·630	·9444	36·907	·9630	38·222	32
33	·9074	34·685	·9259	35·907	·9444	37·167	·9630	38·463	·9815	39·796	33
34	·9259	36·222	·9444	37·463	·9630	38·741	·9815	40·056	1·0000	41·407	34
35	·9444	37·796	·9630	39·056	·9815	40·352	1·0000	41·685	1·0185	43·056	35
36	·9630	39·407	·9815	40·685	1·0000	42·000	1·0185	43·352	1·0370	44·741	36
37	·9815	41·056	1·0000	42·352	1·0185	43·685	1·0370	45·056	1·0556	46·463	37
38	1·0000	42·741	1·0185	44·056	1·0370	45·407	1·0556	46·796	1·0741	48·222	38
39	1·0185	44·463	1·0370	45·796	1·0556	47·167	1·0741	48·574	1·0926	50·019	39
40	1·0370	46·222	1·0556	47·574	1·0741	48·963	1·0926	50·389	1·1111	51·852	40
41	1·0556	48·019	1·0741	49·389	1·0926	50·796	1·1111	52·241	1·1296	53·722	41
42	1·0741	49·852	1·0926	51·241	1·1111	52·667	1·1296	54·130	1·1481	55·630	42
43	1·0926	51·722	1·1111	53·130	1·1296	54·574	1·1481	56·056	1·1667	57·574	43
44	1·1111	53·630	1·1296	55·056	1·1481	56·519	1·1667	58·019	1·1852	59·556	44
45	1·1296	55·574	1·1481	57·019	1·1667	58·500	1·1852	60·019	1·2047	61·574	45
46	1·1481	57·556	1·1667	59·019	1·1852	60·519	1·2047	62·056	1·2222	63·630	46
47	1·1667	59·574	1·1852	61·056	1·2047	62·574	1·2222	64·130	1·2407	65·722	47
48	1·1852	61·630	1·2047	63·130	1·2222	64·667	1·2407	66·241	1·2593	67·852	48
49	1·2047	63·722	1·2222	65·241	1·2407	66·796	1·2593	68·389	1·2778	70·019	49
50	1·2222	65·852	1·2407	67·389	1·2593	68·963	1·2778	70·574	1·2963	72·222	50
	16		17		18		19		20		

Feet.	21		22		23		24		25		Feet.
	Mult.	Add.	Mult.	Add.	Mult.	Add.	Mult.	Add.	Mult.	Add.	
0	·3889	8·167	·4074	8·963	·4259	9·796	·4444	10·667	·4630	11·574	0
1	·4074	8·574	·4259	9·389	·4444	10·241	·4630	11·130	·4815	12·056	1
2	·4259	9·019	·4444	9·852	·4630	10·722	·4815	11·630	·5000	12·574	2
3	·4444	9·500	·4630	10·352	·4815	11·241	·5000	12·167	·5185	13·130	3
4	·4630	10·019	·4815	10·889	·5000	11·796	·5185	12·741	·5370	13·722	4
5	·4815	10·574	·5000	11·463	·5185	12·389	·5370	13·352	·5556	14·352	5
6	·5000	11·167	·5185	12·074	·5370	13·019	·5556	14·000	·5741	15·019	6
7	·5185	11·796	·5370	12·722	·5556	13·685	·5741	14·685	·5926	15·722	7
8	·5370	12·463	·5556	13·407	·5741	14·389	·5926	15·407	·6111	16·463	8
9	·5556	13·167	·5741	14·130	·5926	15·130	·6111	16·167	·6296	17·241	9
10	·5741	13·907	·5926	14·889	·6111	15·907	·6296	16·963	·6481	18·056	10
11	·5926	14·685	·6111	15·685	·6296	16·722	·6481	17·796	·6667	18·907	11
12	·6111	15·500	·6296	16·519	·6481	17·574	·6667	18·667	·6852	19·796	12
13	·6296	16·352	·6481	17·3·9	·6667	18·463	·6852	19·574	·7037	20·722	13
14	·6481	17·241	·6667	18·296	·6852	19·389	·7037	20·519	·7222	21·685	14
15	·6667	18·167	·6852	19·241	·7037	20·352	·7222	21·500	·7407	22·685	15
16	·6852	19·130	·7037	20·222	·7222	21·352	·7407	22·519	·7593	23·722	16
17	·7037	20·130	·7222	21·241	·7407	22·389	·7593	23·574	·7778	24·796	17
18	·7222	21·167	·7407	22·296	·7593	23·463	·7778	24·667	·7963	25·907	18
19	·7407	22·241	·7593	23·389	·7778	24·574	·7963	25·796	·8148	27·056	19
20	·7593	23·352	·7778	24·519	·7963	25·722	·8148	26·963	·8333	28·241	20
21	·7778	24·500	·7963	25·685	·8148	26·907	·8333	28·167	·8519	29·463	21
22	·7963	25·685	·8148	26·889	·8333	28·130	·8519	29·407	·8704	30·722	22
23	·8148	26·907	·8333	28·130	·8519	29·389	·8704	30·685	·8889	32·019	23
24	·8333	28·167	·8519	29·407	·8704	30·685	·8889	32·000	·9074	33·352	24
25	·8519	29·463	·8704	30·722	·8889	32·019	·9074	33·352	·9259	34·722	25
26	·8704	30·796	·8889	32·074	·9074	33·389	·9259	34·741	·9444	36·130	26
27	·8889	32·167	·9074	33·463	·9259	34·796	·9444	36·167	·9630	37·574	27
28	·9074	33·574	·9259	34·889	·9444	36·241	·9630	37·630	·9815	39·056	28
29	·9259	35·019	·9444	36·352	·9630	37·722	·9815	39·130	1·0000	40·574	29
30	·9444	36·500	·9630	37·852	·9815	39·241	1·0000	40·667	1·0185	42·130	30
31	·9630	38·019	·9815	39·389	1·0000	40·796	1·0185	42·241	1·0370	43·722	31
32	·9815	39·574	1·0000	40·963	1·0185	42·389	1·0370	43·852	1·0556	45·352	32
33	1·0000	41·167	1·0185	42·574	1·0370	44·019	1·0556	45·500	1·0741	47·019	33
34	1·0185	42·796	1·0370	44·222	1·0556	45·685	1·0741	47·185	1·0926	48·722	34
35	1·0370	44·463	1·0556	45·907	1·0741	47·389	1·0926	48·907	1·1111	50·463	35
36	1·0556	46·167	1·0741	47·630	1·0926	49·130	1·1111	50·667	1·1296	52·241	36
37	1·0741	47·907	1·0926	49·389	1·1111	50·907	1·1296	52·463	1·1481	54·056	37
38	1·0926	49·685	1·1111	51·185	1·1296	52·722	1·1481	54·296	1·1667	55·907	38
39	1·1111	51·500	1·1296	53·019	1·1481	54·574	1·1667	56·167	1·1852	57·796	39
40	1·1296	53·352	1·1481	54·889	1·1667	56·463	1·1852	58·074	1·2047	59·722	40
41	1·1481	55·241	1·1667	56·796	1·1852	58·389	1·2047	60·019	1·2222	61·685	41
42	1·1667	57·167	1·1852	58·741	1·2047	60·352	1·2222	62·000	1·2407	63·685	42
43	1·1852	59·130	1·2047	60·722	1·2222	62·352	1·2407	64·019	1·2593	65·722	43
44	1·2047	61·130	1·2222	62·741	1·2407	64·389	1·2593	66·074	1·2778	67·796	44
45	1·2222	63·167	1·2407	64·796	1·2593	64·463	1·2778	68·167	1·2963	69·907	45
46	1·2407	65·241	1·2593	66·889	1·2778	68·574	1·2963	70·296	1·3148	72·056	46
47	1·2593	67·352	1·2778	69·019	1·2963	70·722	1·3148	72·463	1·3333	74·241	47
48	1·2778	69·500	1·2963	71·185	1·3148	72·907	1·3333	74·667	1·3519	76·463	48
49	1·2963	71·685	1·3148	73·389	1·3333	75·130	1·3519	76·907	1·3704	78·722	49
50	1·3148	73·907	1·3333	75·630	1·3519	77·389	1·3704	79·185	1·3889	81·019	50
	21		22		23		24		25		

Feet.	26		27		28		29		30		Feet.
	Mult.	Add.	Mult.	Add.	Mult.	Add.	Mult.	Add.	Mult.	Add.	
0	4815	12:519	5000	13:500	5185	14:519	5370	15:574	5556	16:667	0
1	5000	13:019	5185	14:019	5370	15:056	5556	16:130	5741	17:241	1
2	5185	13:556	5370	14:574	5556	15:630	5741	16:722	5926	17:852	2
3	5370	14:130	5556	15:167	5741	16:241	5926	17:352	6111	18:500	3
4	5556	14:741	5741	15:796	5926	16:889	6111	18:019	6296	19:185	4
5	5741	15:389	5926	16:463	6111	17:574	6296	18:722	6481	19:907	5
6	5926	16:074	6111	17:167	6296	18:296	6481	19:463	6667	20:667	6
7	6111	16:796	6296	17:907	6481	19:056	6667	20:241	6852	21:463	7
8	6296	17:556	6481	18:685	6667	19:852	6852	21:056	7037	22:296	8
9	6481	18:352	6667	19:509	6852	20:685	7037	21:907	7222	23:167	9
10	6667	19:185	6852	20:352	7037	21:556	7222	22:796	7407	24:074	10
11	6852	20:056	7037	21:241	7222	22:463	7407	23:722	7593	25:019	11
12	7037	20:963	7222	22:167	7407	23:407	7593	24:685	7778	26:000	12
13	7222	21:907	7407	23:130	7593	24:389	7778	25:685	7963	27:019	13
14	7407	22:889	7593	24:130	7778	25:407	7963	26:722	8148	28:074	14
15	7593	23:907	7778	25:167	7963	26:463	8148	27:796	8333	29:167	15
16	7778	24:963	7963	26:241	8148	27:556	8333	28:907	8519	30:296	16
17	7963	26:056	8148	27:352	8333	28:685	8519	30:056	8704	31:463	17
18	8148	27:185	8333	28:500	8519	29:852	8704	31:241	8889	32:667	18
19	8333	28:352	8519	29:685	8704	31:056	8889	32:463	9074	33:907	19
20	8519	29:556	8704	30:907	8889	32:296	9074	33:722	9259	35:185	20
21	8704	30:796	8889	32:167	9074	33:574	9259	35:019	9444	36:500	21
22	8889	32:074	9074	33:463	9259	34:889	9444	36:352	9630	37:852	22
23	9074	33:389	9259	34:796	9444	36:241	9630	37:722	9815	39:241	23
24	9259	34:741	9444	36:167	9630	37:630	9815	39:130	10000	40:667	24
25	9444	36:130	9630	37:574	9815	39:056	10000	40:574	10185	42:130	25
26	9630	37:556	9815	39:019	10000	40:519	10185	42:056	10370	43:630	26
27	9815	39:019	10000	40:500	10185	42:019	10370	43:574	10556	45:167	27
28	10000	40:519	10185	42:019	10370	43:556	10556	45:130	10741	46:741	28
29	10185	42:056	10370	43:574	10556	45:130	10741	46:722	10926	48:352	29
30	10370	43:630	10556	45:167	10741	46:741	10926	48:352	11111	50:000	30
31	10556	45:241	10741	46:796	10926	48:389	11111	50:019	11296	51:685	31
32	10741	46:889	10926	48:463	11111	50:074	11296	51:722	11481	53:407	32
33	10926	48:574	11111	50:167	11296	51:796	11481	53:463	11667	55:167	33
34	11111	50:296	11296	51:907	11481	53:556	11667	55:241	11852	56:963	34
35	11296	52:056	11481	53:685	11667	55:352	11852	57:056	12047	58:796	35
36	11481	53:852	11667	55:500	11852	57:185	12047	58:907	12222	60:667	36
37	11667	55:685	11852	57:352	12047	59:056	12222	60:796	12407	62:574	37
38	11852	57:556	12047	59:241	12222	60:963	12407	62:722	12593	64:519	38
39	12047	59:463	12222	61:167	12407	62:907	12593	64:685	12778	66:500	39
40	12222	61:407	12407	63:130	12593	64:889	12778	66:685	12963	68:519	40
41	12407	63:389	12593	65:130	12778	66:907	12963	68:722	13148	70:574	41
42	12593	65:407	12778	67:167	12963	68:963	13148	70:796	13333	72:667	42
43	12778	67:463	12963	69:241	13148	71:056	13333	72:907	13519	74:796	43
44	12963	69:556	13148	71:352	13333	73:185	13519	75:056	13704	76:963	44
45	13148	71:685	13333	73:500	13519	75:352	13704	77:241	13889	79:167	45
46	13333	73:852	13519	75:685	13704	77:536	13889	79:463	14074	81:497	46
47	13519	76:056	13704	77:907	13889	79:796	14074	81:722	14259	83:685	47
48	13704	78:296	13889	80:167	14074	82:074	14259	84:019	14444	86:000	48
49	13889	80:574	14074	82:463	14259	84:389	14444	86:352	14630	88:352	49
50	14074	82:889	14259	84:796	14444	86:741	14630	88:722	14815	90:741	50
	26		27		28		29		30		

Feet.	31		32		33		34		35		Feet.
	Mult.	Add.	Mult.	Add.	Mult.	Add.	Mult.	Add.	Mult.	Add.	
0	5741	17-796	5926	18-963	6111	20-167	6296	21-407	6481	22-685	0
1	5926	18-389	6111	19-574	6296	20-796	6481	22-056	6667	23-352	1
2	6111	19-019	6296	20-222	6481	21-463	6667	22-741	6852	24-056	2
3	6296	19-685	6481	20-907	6667	22-167	6852	23-463	7037	24-796	3
4	6481	20-389	6667	21-630	6852	22-907	7037	24-222	7222	25-574	4
5	6667	21-130	6852	22-389	7037	23-685	7222	25-019	7407	26-389	5
6	6852	21-907	7037	23-185	7222	24-500	7407	25-852	7593	27-241	6
7	7037	22-722	7222	24-019	7407	25-352	7593	26-722	7778	28-130	7
8	7222	23-574	7407	24-889	7593	26-241	7778	27-630	7963	29-056	8
9	7407	24-463	7593	25-796	7778	27-167	7963	28-574	8148	30-019	9
10	7593	25-389	7778	26-741	7963	28-130	8148	29-556	8333	31-019	10
11	7778	26-352	7963	27-722	8148	29-130	8333	30-574	8519	32-056	11
12	7963	27-352	8148	28-741	8333	30-167	8519	31-630	8704	33-130	12
13	8148	28-389	8333	29-796	8519	31-241	8704	32-722	8889	34-241	13
14	8333	29-463	8519	30-889	8704	32-352	8889	33-852	9074	35-389	14
15	8519	30-574	8704	32-019	8889	33-500	9074	35-019	9259	36-574	15
16	8704	31-722	8889	33-185	9074	34-685	9259	36-222	9444	37-796	16
17	8889	32-907	9074	34-389	9259	35-907	9444	37-463	9630	39-056	17
18	9074	34-130	9259	35-630	9444	37-167	9630	38-741	9815	40-352	18
19	9259	35-389	9444	36-907	9630	38-463	9815	40-056	1-0000	41-685	19
20	9444	36-685	9630	38-222	9815	39-796	1-0000	41-407	1-0185	43-056	20
21	9630	38-019	9815	39-574	1-0000	41-167	1-0185	42-796	1-0370	44-463	21
22	9815	39-389	1-0000	40-963	1-0185	42-574	1-0370	44-222	1-0556	45-907	22
23	1-0000	40-796	1-0185	42-389	1-0370	44-019	1-0556	45-685	1-0741	47-389	23
24	1-0185	42-241	1-0370	43-852	1-0556	45-500	1-0741	47-185	1-0926	48-907	24
25	1-0370	43-722	1-0556	45-352	1-0741	47-019	1-0926	48-722	1-1111	50-463	25
26	1-0556	45-241	1-0741	46-889	1-0926	48-574	1-1111	50-296	1-1296	52-056	26
27	1-0741	46-796	1-0926	48-463	1-1111	50-167	1-1296	51-907	1-1481	53-685	27
28	1-0926	48-389	1-1111	50-074	1-1296	51-796	1-1481	53-556	1-1667	55-352	28
29	1-1111	50-019	1-1296	51-722	1-1481	53-463	1-1667	55-241	1-1852	57-056	29
30	1-1296	51-685	1-1481	53-407	1-1667	55-167	1-1852	56-963	1-2047	58-796	30
31	1-1481	53-389	1-1667	55-130	1-1852	56-907	1-2047	58-722	1-2222	60-574	31
32	1-1667	55-130	1-1852	56-889	1-2047	58-685	1-2222	60-519	1-2407	62-389	32
33	1-1852	56-907	1-2047	58-685	1-2222	60-500	1-2407	62-352	1-2593	64-241	33
34	1-2047	58-722	1-2222	60-519	1-2407	62-352	1-2593	64-222	1-2778	66-130	34
35	1-2222	60-574	1-2407	62-389	1-2593	64-241	1-2778	66-130	1-2963	68-056	35
36	1-2407	62-463	1-2593	64-296	1-2778	66-167	1-2963	68-074	1-3148	70-019	36
37	1-2593	64-389	1-2778	66-241	1-2963	68-130	1-3148	70-056	1-3333	72-019	37
38	1-2778	66-352	1-2963	68-222	1-3148	70-130	1-3333	72-074	1-3519	74-056	38
39	1-2963	68-352	1-3148	70-241	1-3333	72-167	1-3519	74-130	1-3704	76-130	39
40	1-3148	70-389	1-3333	72-296	1-3519	74-241	1-3704	76-222	1-3889	78-241	40
41	1-3333	72-463	1-3519	74-389	1-3704	76-352	1-3889	78-352	1-4074	80-389	41
42	1-3519	74-574	1-3704	76-519	1-3889	78-500	1-4074	80-519	1-4259	82-574	42
43	1-3704	76-722	1-3889	78-685	1-4074	80-685	1-4259	82-722	1-4444	84-796	43
44	1-3889	78-907	1-4074	80-889	1-4259	82-907	1-4443	84-963	1-4630	87-056	44
45	1-4074	81-130	1-4259	83-130	1-4444	85-167	1-4630	87-241	1-4815	89-352	45
46	1-4259	83-389	1-4444	85-407	1-4630	87-463	1-4815	89-556	1-5000	91-685	46
47	1-4444	85-685	1-4630	87-722	1-4815	89-796	1-5000	91-907	1-5185	94-056	47
48	1-4630	88-019	1-4815	90-074	1-5000	92-167	1-5185	94-296	1-5370	96-463	48
49	1-4815	90-389	1-5000	92-463	1-5185	94-574	1-5370	96-722	1-5556	98-907	49
50	1-5000	92-796	1-5185	94-889	1-5370	97-019	1-5556	99-185	1-5741	101-389	50
	31		32		33		34		35		

TABLE III.—THIRD SERIES. *Base 1.—Slopes 2 to 1.*

Feet.	1		2		3		4		5		Feet.
	Mult.	Add.	Mult.	Add.	Mult.	Add.	Mult.	Add.	Mult.	Add.	
0	·0185	0·025	·0370	0·099	·0556	0·222	·0741	0·395	·0926	0·617	0
1	·0370	0·074	·0556	0·173	·0741	0·321	·0926	0·519	·1111	0·765	1
2	·0556	0·173	·0741	0·296	·0926	0·469	·1111	0·691	·1296	0·963	2
3	·0741	0·321	·0926	0·469	·1111	0·667	·1296	0·914	·1481	1·210	3
4	·0926	0·519	·1111	0·691	·1296	0·914	·1481	1·185	·1667	1·506	4
5	·1111	0·765	·1296	0·963	·1481	1·210	·1667	1·506	·1852	1·852	5
6	·1296	1·062	·1481	1·284	·1667	1·556	·1852	1·877	·2037	2·247	6
7	·1481	1·407	·1667	1·654	·1852	1·951	·2037	2·296	·2222	2·691	7
8	·1667	1·802	·1852	2·074	·2037	2·395	·2222	2·765	·2407	3·185	8
9	·1852	2·247	·2037	2·543	·2222	2·889	·2407	3·284	·2593	3·728	9
10	·2037	2·741	·2222	3·062	·2407	3·432	·2593	3·852	·2778	4·321	10
11	·2222	3·284	·2407	3·630	·2593	4·025	·2778	4·469	·2963	4·963	11
12	·2407	3·887	·2593	4·247	·2778	4·667	·2963	5·136	·3148	5·654	12
13	·2593	4·519	·2778	4·914	·2963	5·358	·3148	5·852	·3333	6·395	13
14	·2778	5·210	·2963	5·630	·3148	6·099	·3333	6·617	·3519	7·185	14
15	·2963	5·951	·3148	6·395	·3333	6·889	·3519	7·432	·3704	8·025	15
16	·3148	6·741	·3333	7·210	·3519	7·728	·3704	8·296	·3889	8·914	16
17	·3333	7·580	·3519	8·074	·3704	8·617	·3889	9·210	·4074	9·852	17
18	·3519	8·469	·3704	8·988	·3889	9·556	·4074	10·173	·4259	10·840	18
19	·3704	9·407	·3889	9·951	·4074	10·543	·4259	11·185	·4444	11·877	19
20	·3889	10·395	·4074	10·963	·4259	11·580	·4444	12·247	·4630	12·963	20
21	·4074	11·432	·4259	12·025	·4444	12·667	·4630	13·358	·4815	14·099	21
22	·4259	12·519	·4444	13·136	·4630	13·802	·4815	14·519	·5000	15·284	22
23	·4444	13·654	·4630	14·296	·4815	14·988	·5000	15·728	·5185	16·519	23
24	·4630	14·840	·4815	15·506	·5000	16·222	·5185	16·988	·5370	17·802	24
25	·4815	16·074	·5000	16·765	·5185	17·506	·5370	18·296	·5556	19·136	25
26	·5000	17·358	·5185	18·074	·5370	18·840	·5556	19·654	·5741	20·519	26
27	·5185	18·691	·5370	19·432	·5556	20·222	·5741	21·062	·5926	21·951	27
28	·5370	20·074	·5556	20·840	·5741	21·654	·5926	22·519	·6111	23·432	28
29	·5556	21·506	·5741	22·296	·5926	23·136	·6111	24·025	·6296	24·963	29
30	·5741	22·988	·5926	23·802	·6111	24·667	·6296	25·580	·6481	26·543	30
31	·5926	24·519	·6111	25·358	·6296	26·247	·6481	27·185	·6667	28·173	31
32	·6111	26·099	·6296	26·963	·6481	27·877	·6667	28·840	·6852	29·852	32
33	·6296	27·728	·6481	28·617	·6667	29·556	·6852	30·543	·7037	31·580	33
34	·6481	29·407	·6667	30·321	·6852	31·284	·7037	32·296	·7222	33·358	34
35	·6667	31·136	·6852	32·074	·7037	33·062	·7222	34·099	·7407	35·185	35
36	·6852	32·914	·7037	33·877	·7222	34·889	·7407	35·951	·7593	37·062	36
37	·7037	34·741	·7222	35·728	·7407	36·765	·7593	37·852	·7778	38·988	37
38	·7222	36·617	·7407	37·630	·7593	38·691	·7778	39·802	·7963	40·963	38
39	·7407	38·543	·7593	39·580	·7778	40·667	·7963	41·802	·8148	42·988	39
40	·7593	40·519	·7778	41·580	·7963	42·691	·8148	43·852	·8333	45·062	40
41	·7778	42·543	·7963	43·630	·8148	44·765	·8333	45·951	·8519	47·185	41
42	·7963	44·617	·8148	45·728	·8333	46·889	·8519	48·099	·8704	49·358	42
43	·8148	46·741	·8333	47·877	·8519	49·062	·8704	50·296	·8889	51·580	43
44	·8333	48·914	·8519	50·074	·8704	51·284	·8889	52·543	·9074	53·852	44
45	·8519	51·136	·8704	52·321	·8889	53·556	·9074	54·840	·9259	56·173	45
46	·8704	53·407	·8889	54·617	·9074	55·877	·9259	57·185	·9444	58·543	46
47	·8889	55·728	·9074	56·963	·9259	58·247	·9444	59·580	·9630	60·963	47
48	·9074	58·099	·9259	59·358	·9444	60·667	·9630	62·025	·9815	63·432	48
49	·9259	60·519	·9444	61·332	·9630	63·136	·9815	64·519	1·0000	65·951	49
50	·9444	62·988	·9630	64·296	·9815	65·654	1·0000	67·062	1·0185	68·519	50
	1		2		3		4		5		

Feet.	6		7		8		9		10		Feet.
	Mult.	Add.	Mult.	Add.	Mult.	Add.	Mult.	Add.	Mult.	Add.	
0	.1111	0.889	.1296	1.210	.1481	1.580	.1667	2.000	.1852	2.469	0
1	.1296	1.062	.1481	1.407	.1667	1.802	.1852	2.247	.2037	2.741	1
2	.1481	1.284	.1667	1.654	.1852	2.074	.2037	2.543	.2222	3.062	2
3	.1667	1.556	.1852	1.951	.2037	2.395	.2222	2.889	.2407	3.432	3
4	.1852	1.877	.2037	2.296	.2222	2.765	.2407	3.284	.2593	3.852	4
5	.2037	2.247	.2222	2.691	.2407	3.185	.2593	3.728	.2778	4.321	5
6	.2222	2.667	.2407	3.136	.2593	3.634	.2778	4.222	.2963	4.840	6
7	.2407	3.136	.2593	3.630	.2778	4.173	.2963	4.765	.3148	5.407	7
8	.2593	3.654	.2778	4.173	.2963	4.741	.3148	5.358	.3333	6.025	8
9	.2778	4.222	.2963	4.765	.3148	5.358	.3333	6.000	.3519	6.691	9
10	.2963	4.840	.3148	5.407	.3333	6.025	.3519	6.691	.3704	7.407	10
11	.3148	5.506	.3333	6.099	.3519	6.741	.3704	7.432	.3889	8.173	11
12	.3333	6.222	.3519	6.840	.3704	7.506	.3889	8.222	.4074	8.988	12
13	.3519	6.988	.3704	7.630	.3889	8.321	.4074	9.062	.4259	9.852	13
14	.3704	7.802	.3889	8.469	.4074	9.185	.4259	9.951	.4444	10.765	14
15	.3889	8.667	.4074	9.358	.4259	10.099	.4444	10.889	.4630	11.728	15
16	.4074	9.580	.4259	10.296	.4444	11.062	.4630	11.877	.4815	12.741	16
17	.4259	10.543	.4444	11.284	.4630	12.074	.4815	12.914	.5000	13.802	17
18	.4444	11.556	.4630	12.321	.4815	13.136	.5000	14.000	.5185	14.914	18
19	.4630	12.617	.4815	13.407	.5000	14.247	.5185	15.136	.5370	16.074	19
20	.4815	13.728	.5000	14.543	.5185	15.407	.5370	16.321	.5556	17.284	20
21	.5000	14.889	.5185	15.728	.5370	16.617	.5556	17.556	.5741	18.543	21
22	.5185	16.099	.5370	16.963	.5556	17.877	.5741	18.840	.5926	19.852	22
23	.5370	17.358	.5556	18.247	.5741	19.185	.5926	20.173	.6111	21.210	23
24	.5556	18.667	.5741	19.580	.5926	20.543	.6111	21.556	.6296	22.617	24
25	.5741	20.025	.5926	20.963	.6111	21.951	.6296	22.988	.6481	24.074	25
26	.5926	21.432	.6111	22.395	.6296	23.407	.6481	24.469	.6667	25.580	26
27	.6111	22.889	.6296	23.877	.6481	24.914	.6667	26.000	.6852	27.136	27
28	.6296	24.395	.6481	25.407	.6667	26.469	.6852	27.580	.7037	28.741	28
29	.6481	25.951	.6667	26.988	.6852	28.074	.7037	29.210	.7222	30.395	29
30	.6667	27.556	.6852	28.617	.7037	29.728	.7222	30.889	.7407	32.099	30
31	.6852	29.210	.7037	30.296	.7222	31.432	.7407	32.617	.7593	33.852	31
32	.7037	30.914	.7222	32.025	.7407	33.185	.7593	34.395	.7778	35.654	32
33	.7222	32.667	.7407	33.802	.7593	34.988	.7778	36.222	.7963	37.506	33
34	.7407	34.469	.7593	35.630	.7778	36.840	.7963	38.099	.8148	39.407	34
35	.7593	36.321	.7778	37.506	.7963	38.741	.8148	40.025	.8333	41.358	35
36	.7778	38.222	.7963	39.432	.8148	40.691	.8333	42.000	.8519	43.358	36
37	.7963	40.173	.8148	41.407	.8333	42.691	.8519	44.025	.8704	45.407	37
38	.8148	42.173	.8333	43.432	.8519	44.741	.8704	46.099	.8889	47.506	38
39	.8333	44.222	.8519	45.506	.8704	46.840	.8889	48.222	.9074	49.654	39
40	.8519	46.321	.8704	47.630	.8889	48.988	.9074	50.395	.9259	51.852	40
41	.8704	48.469	.8889	49.802	.9074	51.185	.9259	52.617	.9444	54.099	41
42	.8889	50.667	.9074	52.025	.9259	53.432	.9444	54.889	.9630	56.395	42
43	.9074	52.914	.9259	54.296	.9444	55.728	.9630	57.210	.9815	58.741	43
44	.9259	55.210	.9444	56.617	.9630	58.074	.9815	59.580	1.0000	61.136	44
45	.9444	57.556	.9630	58.988	.9815	60.469	1.0000	62.000	1.0185	63.580	45
46	.9630	59.951	.9815	61.407	1.0000	62.914	1.0185	64.469	1.0370	66.074	46
47	.9815	62.395	1.0000	63.877	1.0185	65.407	1.0370	66.988	1.0556	68.617	47
48	1.0000	64.889	1.0185	66.395	1.0370	67.951	1.0556	69.556	1.0741	71.210	48
49	1.0185	67.432	1.0370	68.963	1.0556	70.543	1.0741	72.173	1.0926	73.852	49
50	1.0370	70.025	1.0556	71.580	1.0741	73.185	1.0926	74.840	1.1111	76.543	50
	6		7		8		9		10		

Feet.	11		12		13		14		15		Feet.
	Mult.	Add.	Mult.	Add.	Mult.	Add.	Mult.	Add.	Mult.	Add.	
0	·2037	2·988	·2222	3·556	·2407	4·173	·2593	4·840	·2778	5·556	0
1	·2222	3·284	·2407	3·877	·2593	4·519	·2778	5·210	·2963	5·951	1
2	·2407	3·630	·2593	4·247	·2778	4·914	·2963	5·630	·3148	6·395	2
3	·2593	4·025	·2778	4·667	·2963	5·358	·3148	6·099	·3333	6·889	3
4	·2778	4·469	·2963	5·136	·3148	5·852	·3333	6·617	·3519	7·432	4
5	·2963	4·963	·3148	5·654	·3333	6·395	·3519	7·185	·3704	8·025	5
6	·3148	5·506	·3333	6·222	·3519	6·988	·3704	7·802	·3889	8·667	6
7	·3333	6·099	·3519	6·840	·3704	7·630	·3889	8·469	·4074	9·358	7
8	·3519	6·741	·3704	7·506	·3889	8·321	·4074	9·185	·4259	10·099	8
9	·3704	7·432	·3889	8·222	·4074	9·062	·4259	9·951	·4444	10·889	9
10	·3889	8·173	·4074	8·988	·4259	9·852	·4444	10·765	·4630	11·728	10
11	·4074	8·963	·4259	9·802	·4444	10·691	·4630	11·630	·4815	12·617	11
12	·4259	9·302	·4444	10·667	·4630	11·580	·4815	12·543	·5000	13·556	12
13	·4444	10·691	·4630	11·580	·4815	12·519	·5000	13·506	·5185	14·543	13
14	·4630	11·630	·4815	12·543	·5000	13·506	·5185	14·519	·5370	15·580	14
15	·4815	12·617	·5000	13·556	·5185	14·543	·5370	15·580	·5556	16·667	15
16	·5000	13·654	·5185	14·617	·5370	15·630	·5556	16·691	·5741	17·802	16
17	·5185	14·741	·5370	15·728	·5556	16·765	·5741	17·852	·5926	18·988	17
18	·5370	15·877	·5556	16·889	·5741	17·951	·5936	19·062	·6111	20·222	18
19	·5556	17·062	·5741	18·099	·5926	19·185	·6111	20·321	·6296	21·506	19
20	·5741	18·296	·5926	19·358	·6111	20·469	·6296	21·630	·6481	22·840	20
21	·5926	19·580	·6111	20·667	·6296	21·802	·6481	22·988	·6667	24·222	21
22	·6111	20·914	·6296	22·025	·6481	23·185	·6667	24·395	·6852	25·654	22
23	·6296	22·296	·6481	23·432	·6667	24·617	·6852	25·852	·7037	27·136	23
24	·6481	23·728	·6667	24·889	·6852	26·099	·7037	27·358	·7222	28·667	24
25	·6667	25·210	·6852	26·395	·7037	27·630	·7222	28·914	·7407	30·247	25
26	·6852	26·741	·7037	27·951	·7222	29·210	·7407	30·519	·7593	31·877	26
27	·7037	28·321	·7222	29·556	·7407	30·840	·7593	32·173	·7778	33·556	27
28	·7222	29·951	·7407	31·210	·7593	32·519	·7778	33·877	·7963	35·284	28
29	·7407	31·630	·7593	32·914	·7778	34·247	·7963	35·630	·8148	37·062	29
30	·7593	33·358	·7778	34·667	·7963	36·025	·8148	37·432	·8333	38·889	30
31	·7778	35·136	·7963	36·469	·8148	37·852	·8333	39·284	·8519	40·765	31
32	·7963	36·963	·8148	38·321	·8333	39·728	·8519	41·185	·8704	42·691	32
33	·8148	38·840	·8333	40·222	·8519	41·654	·8704	43·136	·8889	44·667	33
34	·8333	40·765	·8519	42·173	·8704	43·630	·8889	45·136	·9074	46·691	34
35	·8519	42·741	·8704	44·173	·8889	45·654	·9074	47·185	·9259	48·765	35
36	·8704	44·765	·8889	46·222	·9074	47·728	·9259	49·284	·9444	50·889	36
37	·8889	46·840	·9074	48·321	·9259	49·852	·9444	51·432	·9630	53·062	37
38	·9074	48·963	·9259	50·469	·9444	52·025	·9630	53·630	·9815	55·284	38
39	·9259	51·136	·9444	52·667	·9630	54·247	·9815	55·877	1·0000	57·556	39
40	·9444	53·358	·9630	54·914	·9815	56·519	1·0000	58·173	1·0185	59·877	40
41	·9630	55·630	·9815	57·210	1·0000	58·840	1·0185	60·519	1·0370	62·247	41
42	·9815	57·951	1·0000	59·556	1·0185	61·210	1·0370	62·914	1·0556	64·667	42
43	1·0000	60·321	1·0185	61·951	1·0370	63·630	1·0556	65·358	1·0741	67·136	43
44	1·0185	62·741	1·0370	64·395	1·0556	66·099	1·0741	67·852	1·0926	69·651	44
45	1·0370	65·210	1·0556	66·889	1·0741	68·617	1·0926	70·395	1·1111	72·222	45
46	1·0556	67·728	1·0741	69·432	1·0926	71·185	1·1111	72·988	1·1296	74·840	46
47	1·0741	70·296	1·0926	72·025	1·1111	73·802	1·1296	75·630	1·1481	77·506	47
48	1·0926	72·914	1·1111	74·667	1·1296	76·469	1·1481	78·321	1·1667	80·222	48
49	1·1111	75·580	1·1296	77·358	1·1481	79·185	1·1667	81·062	1·1852	82·988	49
50	1·1296	78·296	1·1481	80·099	1·1667	81·951	1·1852	83·852	1·2047	85·802	50
	11		12		13		14		15		

Feet.	16		17		18		19		20		Feet.
	Mult.	Add.	Mult.	Add.	Mult.	Add.	Mult.	Add.	Mult.	Add.	
0	·2963	6·321	·3148	7·136	·3333	8·000	·3519	8·914	·3704	9·877	0
1	·3148	6·741	·3333	7·580	·3519	8·469	·3704	9·407	·3889	10·395	1
2	·3333	7·210	·3519	8·074	·3704	8·988	·3889	9·951	·4074	10·963	2
3	·3519	7·728	·3704	8·617	·3889	9·536	·4074	10·543	·4259	11·580	3
4	·3704	8·296	·3889	9·210	·4074	10·173	·4259	11·185	·4444	12·247	4
5	·3889	8·914	·4074	9·852	·4259	10·840	·4444	11·877	·4630	12·963	5
6	·4074	9·580	·4259	10·543	·4444	11·556	·4630	12·617	·4815	13·728	6
7	·4259	10·206	·4444	11·284	·4630	12·321	·4815	13·407	·5000	14·543	7
8	·4444	11·062	·4630	12·074	·4815	13·136	·5000	14·247	·5185	15·407	8
9	·4630	11·877	·4815	12·914	·5000	14·000	·5185	15·136	·5370	16·321	9
10	·4815	12·741	·5000	13·802	·5185	14·914	·5370	16·074	·5556	17·284	10
11	·5000	13·654	·5185	14·741	·5370	15·877	·5556	17·062	·5741	18·296	11
12	·5185	14·617	·5370	15·728	·5556	16·889	·5741	18·099	·5926	19·358	12
13	·5370	15·630	·5556	16·765	·5741	17·951	·5926	19·185	·6111	20·469	13
14	·5556	16·691	·5741	17·852	·5926	19·062	·6111	20·321	·6296	21·630	14
15	·5741	17·802	·5926	18·988	·6111	20·222	·6296	21·506	·6481	22·840	15
16	·5926	18·963	·6111	20·173	·6296	21·432	·6481	22·741	·6667	24·099	16
17	·6111	20·173	·6296	21·407	·6481	22·691	·6667	24·025	·6852	25·407	17
18	·6296	21·432	·6481	22·691	·6667	24·000	·6852	25·358	·7037	26·765	18
19	·6481	22·741	·6667	24·025	·6852	25·358	·7037	26·741	·7222	28·173	19
20	·6667	24·099	·6852	25·407	·7037	26·765	·7222	28·173	·7407	29·630	20
21	·6852	25·506	·7037	26·840	·7222	28·222	·7407	29·654	·7593	31·136	21
22	·7037	26·963	·7222	28·321	·7407	29·728	·7593	31·185	·7778	32·691	22
23	·7222	28·469	·7407	29·852	·7593	31·284	·7778	32·765	·7963	34·296	23
24	·7407	30·025	·7592	31·432	·7778	32·889	·7963	34·395	·8148	35·951	24
25	·7593	31·630	·7778	33·062	·7963	34·543	·8148	36·074	·8333	37·654	25
26	·7778	33·284	·7963	34·741	·8148	36·247	·8333	37·802	·8519	39·407	26
27	·7963	34·988	·8148	36·469	·8333	38·000	·8519	39·580	·8704	41·210	27
28	·8148	36·741	·8333	38·247	·8519	39·802	·8704	41·407	·8889	43·062	28
29	·8333	38·543	·8519	40·074	·8704	41·654	·8889	43·284	·9074	44·963	29
30	·8519	40·395	·8704	41·951	·8889	43·556	·9074	45·210	·9259	46·914	30
31	·8704	42·296	·8889	43·877	·9074	45·506	·9259	47·185	·9444	48·914	31
32	·8889	44·247	·9074	45·852	·9259	47·506	·9444	49·210	·9630	50·963	32
33	·9074	46·247	·9259	47·877	·9444	49·556	·9630	51·284	·9815	53·062	33
34	·9259	48·296	·9444	49·951	·9630	51·654	·9815	53·407	1·0000	55·210	34
35	·9444	50·395	·9630	52·074	·9815	53·802	1·0000	55·580	1·0185	57·407	35
36	·9630	52·543	·9815	54·247	1·0000	56·000	1·0185	57·802	1·0370	59·654	36
37	·9815	54·741	1·0000	56·469	1·0185	58·247	1·0370	60·074	1·0556	61·951	37
38	1·0000	56·988	1·0185	58·741	1·0370	60·543	1·0556	62·395	1·0741	64·296	38
39	1·0185	59·284	1·0370	61·062	1·0556	62·839	1·0741	64·765	1·0926	66·691	39
40	1·0370	61·630	1·0556	63·432	1·0741	65·284	1·0926	67·185	1·1111	69·136	40
41	1·0556	64·025	1·0741	65·852	1·0926	67·728	1·1111	69·654	1·1296	71·630	41
42	1·0741	66·469	1·0926	68·321	1·1111	70·222	1·1296	72·173	1·1481	74·173	42
43	1·0926	68·963	1·1111	70·840	1·1296	72·765	1·1481	74·741	1·1667	76·765	43
44	1·1111	71·506	1·1296	73·407	1·1481	75·358	1·1667	77·358	1·1852	79·407	44
45	1·1296	74·099	1·1481	76·025	1·1667	78·000	1·1852	80·025	1·2047	82·099	45
46	1·1481	76·741	1·1667	78·691	1·1852	80·691	1·2047	82·741	1·2232	84·840	46
47	1·1667	79·432	1·1852	81·407	1·2047	83·432	1·2232	85·506	1·2407	87·630	47
48	1·1852	82·173	1·2047	84·173	1·2232	86·222	1·2407	88·321	1·2593	90·469	48
49	1·2047	84·963	1·2232	86·988	1·2407	89·062	1·2593	91·185	1·2778	93·358	49
50	1·2232	87·802	1·2407	89·852	1·2593	91·951	1·2778	94·099	1·2963	96·296	50
	16		17		18		19		20		

TABLES

OF

THE CIRCUMFERENCES OF CIRCLES

TO THE NEAREST FRACTION OF PRACTICAL MEASUREMENT;

ALSO,

THE AREAS OF CIRCLES,

In inches and decimal parts, likewise of feet and decimal parts

AS MAY BE REQUIRED.

Diam. in inches	Circum. in feet. in.	Area in square in.	Side of Equal sq.	Diam. in inches.	Circum. in feet. in.	Area in square in.	Area in square ft.
•0625	•196	•0030	•0554	4 in.	1 0 $\frac{1}{2}$	12•566	•0879
•125	•392	•0122	•1107	4 $\frac{1}{8}$	1 0 $\frac{7}{8}$	13•364	•0935
•1875	•589	•0276	•1661	4 $\frac{1}{4}$	1 1 $\frac{1}{8}$	14•186	•0993
•25	•785	•0490	•2115	4 $\frac{3}{8}$	1 1 $\frac{3}{8}$	15•033	•1052
•3125	•981	•0767	•2669	4 $\frac{1}{2}$	1 2 $\frac{1}{4}$	15•904	•1113
•3750	1•178	•1104	•3223	4 $\frac{5}{8}$	1 2 $\frac{3}{8}$	16•800	•1176
•4375	1•374	•1503	•3771	4 $\frac{3}{4}$	1 2 $\frac{7}{8}$	17•720	•1240
•50	1•570	•1963	•4331	4 $\frac{7}{8}$	1 3 $\frac{1}{8}$	18•665	•1306
•5625	1•767	•2485	•4995	5 in.	1 3 $\frac{5}{8}$	19•635	•1374
•625	1•963	•3068	•5428	5 $\frac{1}{8}$	1 4 $\frac{1}{8}$	20•629	•1444
•6875	2•159	•3712	•6093	5 $\frac{1}{4}$	1 4 $\frac{3}{8}$	21•647	•1515
•75	2•356	•4417	•6646	5 $\frac{3}{8}$	1 4 $\frac{7}{8}$	22•690	•1588
•8125	2•552	•5185	•7200	5 $\frac{1}{2}$	1 5 $\frac{1}{4}$	23•758	•1663
•8750	2•748	•6013	•7754	5 $\frac{5}{8}$	1 5 $\frac{5}{8}$	24•850	•1739
•9375	2•945	•6903	•8308	5 $\frac{3}{4}$	1 6 $\frac{1}{8}$	25•967	•1817
1 in.	3 $\frac{1}{8}$	•7854	•8862	5 $\frac{7}{8}$	1 6 $\frac{3}{8}$	27•108	•1897
1 $\frac{1}{8}$	3 $\frac{3}{8}$	•9940	•9969	6 in.	1 6 $\frac{7}{8}$	28•274	•1979
1 $\frac{1}{4}$	3 $\frac{7}{8}$	1•227	1•0775	6 $\frac{1}{8}$	1 7 $\frac{1}{8}$	29•464	•2062
1 $\frac{3}{8}$	4 $\frac{1}{8}$	1•484	1•2185	6 $\frac{1}{4}$	1 7 $\frac{3}{8}$	30•679	•2147
1 $\frac{1}{2}$	4 $\frac{3}{4}$	1•767	1•3203	6 $\frac{3}{8}$	1 8 $\frac{1}{8}$	31•919	•2234
1 $\frac{5}{8}$	5 $\frac{1}{8}$	2•074	1•4401	6 $\frac{1}{2}$	1 8 $\frac{3}{8}$	33•183	•2322
1 $\frac{7}{8}$	5 $\frac{5}{8}$	2•405	1•5508	6 $\frac{5}{8}$	1 8 $\frac{7}{8}$	34•471	•2412
1 $\frac{3}{4}$	5 $\frac{7}{8}$	2•761	1•6616	6 $\frac{3}{4}$	1 9 $\frac{1}{8}$	35•784	•2504
2 in.	6 $\frac{1}{8}$	3•141	1•7724	6 $\frac{7}{8}$	1 9 $\frac{3}{8}$	37•122	•2598
2 $\frac{1}{8}$	6 $\frac{5}{8}$	3•546	1•8831	7 in.	1 10	38•484	•2693
2 $\frac{1}{4}$	7	3•976	1•9939	7 $\frac{1}{8}$	1 10 $\frac{1}{8}$	39•871	•2791
2 $\frac{3}{8}$	7 $\frac{1}{8}$	4•430	2•1047	7 $\frac{1}{4}$	1 10 $\frac{3}{8}$	41•282	•2889
2 $\frac{1}{2}$	7 $\frac{5}{8}$	4•908	2•2155	7 $\frac{3}{8}$	1 11 $\frac{1}{8}$	42•718	•2990
2 $\frac{5}{8}$	8 $\frac{1}{8}$	5•412	2•3262	7 $\frac{1}{2}$	1 11 $\frac{3}{8}$	44•178	•3092
2 $\frac{7}{8}$	8 $\frac{5}{8}$	5•939	2•4370	7 $\frac{5}{8}$	1 11 $\frac{7}{8}$	45•663	•3196
3 in.	9	6•491	2•5478	7 $\frac{3}{4}$	2 0 $\frac{1}{8}$	47•173	•3299
3 $\frac{1}{8}$	9 $\frac{1}{8}$	7•068	2•6586	7 $\frac{7}{8}$	2 0 $\frac{3}{8}$	48•707	•3409
3 $\frac{1}{4}$	9 $\frac{3}{4}$	7•669	2•7694	8 in.	2 1 $\frac{1}{8}$	50•265	•3518
3 $\frac{3}{8}$	10 $\frac{1}{8}$	8•295	2•8801	8 $\frac{1}{8}$	2 1 $\frac{3}{8}$	51•848	•3629
3 $\frac{1}{2}$	10 $\frac{3}{4}$	8•946	2•9909	8 $\frac{1}{4}$	2 1 $\frac{5}{8}$	53•456	•3741
3 $\frac{5}{8}$	11	9•621	3•1017	8 $\frac{3}{8}$	2 2 $\frac{1}{8}$	55•088	•3856
3 $\frac{7}{8}$	11 $\frac{1}{8}$	10•320	3•2124	8 $\frac{1}{2}$	2 2 $\frac{3}{8}$	56•745	•3972
3 $\frac{3}{4}$	11 $\frac{3}{4}$	11•044	3•3232	8 $\frac{5}{8}$	2 3	58•426	•4089
4 in.	12 $\frac{1}{8}$	11•793	3•4340	8 $\frac{3}{4}$	2 3 $\frac{1}{8}$	60•132	•4209
	12 $\frac{3}{8}$			8 $\frac{7}{8}$	2 3 $\frac{3}{8}$	61•862	•4330

Diam. in inches.	Circum. in feet. in.	Area in square in.	Area in square ft.	Diam. in inches.	Circum. in feet. in.	Area in square in.	Area in square ft.
9 in.	2 4 $\frac{1}{2}$	63·617	·4453	16 in.	4 2 $\frac{1}{2}$	201·062	1·4074
9 $\frac{1}{8}$	2 4 $\frac{1}{4}$	65·396	·4577	16 $\frac{1}{8}$	4 2 $\frac{3}{8}$	204·216	1·4295
9 $\frac{1}{4}$	2 5	67·200	·4704	16 $\frac{1}{4}$	4 3	207·394	1·4517
9 $\frac{3}{8}$	2 5 $\frac{1}{8}$	69·029	·4832	16 $\frac{3}{8}$	4 3 $\frac{1}{8}$	210·597	1·4741
9 $\frac{1}{2}$	2 5 $\frac{1}{2}$	70·882	·4961	16 $\frac{1}{2}$	4 3 $\frac{1}{2}$	213·825	1·4967
9 $\frac{3}{4}$	2 6 $\frac{1}{4}$	72·759	·5093	16 $\frac{3}{4}$	4 4 $\frac{1}{4}$	217·077	1·5195
9 $\frac{7}{8}$	2 6 $\frac{3}{8}$	74·662	·5226	16 $\frac{7}{8}$	4 4 $\frac{3}{8}$	220·353	1·5424
10	2 7	76·588	·5361	16 $\frac{5}{8}$	4 5	223·654	1·5655
10 in.	2 7 $\frac{1}{2}$	78·540	·5497	17 in.	4 5 $\frac{1}{2}$	226·980	1·5888
10 $\frac{1}{8}$	2 7 $\frac{1}{4}$	80·515	·5636	17 $\frac{1}{8}$	4 5 $\frac{3}{8}$	230·330	1·6123
10 $\frac{1}{4}$	2 8	82·516	·5776	17 $\frac{1}{4}$	4 6	233·705	1·6359
10 $\frac{3}{8}$	2 8 $\frac{1}{8}$	84·540	·5917	17 $\frac{3}{8}$	4 6 $\frac{1}{8}$	237·104	1·6597
10 $\frac{1}{2}$	2 8 $\frac{1}{2}$	86·590	·6061	17 $\frac{1}{2}$	4 6 $\frac{1}{2}$	240·528	1·6836
10 $\frac{3}{4}$	2 9	88·664	·6206	17 $\frac{3}{4}$	4 7	243·977	1·7078
10 $\frac{7}{8}$	2 9 $\frac{1}{8}$	90·762	·6353	17 $\frac{7}{8}$	4 7 $\frac{1}{8}$	247·450	1·7321
11	2 10	92·855	·6499	17 $\frac{5}{8}$	4 8 $\frac{1}{8}$	250·947	1·7566
11 in.	2 10 $\frac{1}{2}$	95·033	·6652	18 in.	4 8 $\frac{1}{2}$	254·469	1·7812
11 $\frac{1}{8}$	2 10 $\frac{1}{4}$	97·205	·6804	18 $\frac{1}{8}$	4 8 $\frac{3}{8}$	258·016	1·8061
11 $\frac{1}{4}$	2 11	99·402	·6958	18 $\frac{1}{4}$	4 9	261·587	1·8311
11 $\frac{3}{8}$	2 11 $\frac{1}{8}$	101·623	·7113	18 $\frac{3}{8}$	4 9 $\frac{1}{8}$	265·182	1·8562
11 $\frac{1}{2}$	3 0 $\frac{1}{2}$	103·869	·7270	18 $\frac{1}{2}$	4 10	268·803	1·8816
11 $\frac{3}{4}$	3 0 $\frac{3}{4}$	106·139	·7429	18 $\frac{3}{4}$	4 10 $\frac{1}{4}$	272·447	1·9071
11 $\frac{7}{8}$	3 0 $\frac{7}{8}$	108·434	·7590	18 $\frac{7}{8}$	4 10 $\frac{3}{8}$	276·117	1·9328
12	3 1	110·753	·7752	18 $\frac{5}{8}$	4 11 $\frac{1}{8}$	279·811	1·9586
12 in.	3 1 $\frac{1}{2}$	113·097	·7916	19 in.	4 11 $\frac{1}{2}$	283·529	1·9847
12 $\frac{1}{8}$	3 2	115·466	·8082	19 $\frac{1}{8}$	5 0	287·272	1·9941
12 $\frac{1}{4}$	3 2 $\frac{1}{4}$	117·859	·8250	19 $\frac{1}{4}$	5 0 $\frac{1}{4}$	291·039	2·0371
12 $\frac{3}{8}$	3 2 $\frac{3}{8}$	120·276	·8419	19 $\frac{3}{8}$	5 0 $\frac{3}{8}$	294·831	2·0637
12 $\frac{1}{2}$	3 3	122·718	·8590	19 $\frac{1}{2}$	5 1	298·648	2·0904
12 $\frac{3}{4}$	3 3 $\frac{1}{4}$	125·185	·8762	19 $\frac{3}{4}$	5 1 $\frac{1}{4}$	302·489	2·1172
12 $\frac{7}{8}$	3 4	127·676	·8937	19 $\frac{7}{8}$	5 2	306·355	2·1443
13	3 4 $\frac{1}{2}$	130·192	·9113	19 $\frac{5}{8}$	5 2 $\frac{1}{8}$	310·245	2·1716
13 in.	3 4 $\frac{3}{4}$	132·732	·9291	20 in.	5 2 $\frac{1}{2}$	314·160	2·1990
13 $\frac{1}{8}$	3 5	135·297	·9470	20 $\frac{1}{8}$	5 3	318·099	2·2265
13 $\frac{1}{4}$	3 5 $\frac{1}{4}$	137·886	·9642	20 $\frac{1}{4}$	5 3 $\frac{1}{4}$	322·063	2·2543
13 $\frac{3}{8}$	3 6	140·500	·9835	20 $\frac{3}{8}$	5 4	326·051	2·2822
13 $\frac{1}{2}$	3 6 $\frac{1}{2}$	143·139	1·0019	20 $\frac{1}{2}$	5 4 $\frac{1}{2}$	330·064	2·3103
13 $\frac{3}{4}$	3 6 $\frac{3}{4}$	145·802	1·0206	20 $\frac{3}{4}$	5 4 $\frac{3}{4}$	334·101	2·3386
13 $\frac{7}{8}$	3 7	148·489	1·0294	20 $\frac{7}{8}$	5 5	338·163	2·3670
14	3 7 $\frac{1}{2}$	151·201	1·0584	21 in.	5 5 $\frac{1}{2}$	342·250	2·3956
14 in.	3 7 $\frac{3}{4}$	153·938	1·0775	21 $\frac{1}{8}$	5 6	346·361	2·4244
14 $\frac{1}{8}$	3 8	156·699	1·0968	21 $\frac{1}{4}$	5 6 $\frac{1}{4}$	350·497	2·4533
14 $\frac{1}{4}$	3 8 $\frac{1}{4}$	159·485	1·1193	21 $\frac{3}{8}$	5 6 $\frac{3}{8}$	354·657	2·4824
14 $\frac{3}{8}$	3 9	162·295	1·1360	21 $\frac{1}{2}$	5 7	358·841	2·5117
14 $\frac{1}{2}$	3 9 $\frac{1}{2}$	165·130	1·1569	21 $\frac{3}{4}$	5 7 $\frac{1}{4}$	363·051	2·5412
14 $\frac{3}{4}$	3 9 $\frac{3}{4}$	167·989	1·1749	21 $\frac{7}{8}$	5 7 $\frac{3}{8}$	367·284	2·5708
15	3 10	170·873	1·1961	21 $\frac{5}{8}$	5 8	371·543	2·6007
15 in.	3 10 $\frac{1}{2}$	173·782	1·2164	21 $\frac{1}{2}$	5 8 $\frac{1}{2}$	375·826	2·6306
15 $\frac{1}{8}$	3 11	176·715	1·2370	22 in.	5 9	380·133	2·6608
15 $\frac{1}{4}$	3 11 $\frac{1}{4}$	179·672	1·2577	22 $\frac{1}{8}$	5 9 $\frac{1}{8}$	384·465	2·6691
15 $\frac{3}{8}$	3 11 $\frac{3}{8}$	182·654	1·2785	22 $\frac{1}{4}$	5 9 $\frac{1}{4}$	388·822	2·7016
15 $\frac{1}{2}$	4 0	185·661	1·2996	22 $\frac{3}{8}$	5 10	393·203	2·7224
15 $\frac{3}{4}$	4 0 $\frac{1}{4}$	188·692	1·3208	22 $\frac{1}{2}$	5 10 $\frac{1}{2}$	397·608	2·7632
15 $\frac{7}{8}$	4 1	191·748	1·3422	22 $\frac{5}{8}$	5 11	402·038	2·7980
16	4 1 $\frac{1}{2}$	194·828	1·3637	22 $\frac{3}{4}$	5 11 $\frac{1}{4}$	406·493	2·8054
16 in.	4 1 $\frac{3}{4}$	197·933	1·3855	22 $\frac{7}{8}$	5 11 $\frac{3}{8}$	410·972	2·8658

Diam. in inches.	Circum. in feet. in.	Area in square in.	Area in square ft.	Diam. in inches.	Circum. in feet. in.	Area in square in.	Area in square ft.
1 11	6 0 $\frac{1}{2}$	415-476	2-8903	3 0	9 5	1017-87	7-0688
1 11 $\frac{1}{2}$	6 0 $\frac{3}{4}$	420-004	2-9100	3 0 $\frac{1}{2}$	9 5 $\frac{1}{2}$	1032-06	7-1671
1 11 $\frac{1}{4}$	6 1	424-557	2-9518	3 0 $\frac{1}{4}$	9 6 $\frac{1}{4}$	1046-35	7-2664
1 11 $\frac{1}{8}$	6 1 $\frac{1}{8}$	429-135	2-9937	3 0 $\frac{3}{8}$	9 7 $\frac{1}{8}$	1060-73	7-3662
1 11 $\frac{1}{2}$	6 1 $\frac{1}{2}$	433-737	3-0129	3 1	9 8 $\frac{1}{4}$	1075-21	7-4661
1 11 $\frac{3}{8}$	6 2 $\frac{1}{8}$	438-363	3-0261	3 1 $\frac{1}{4}$	9 9	1089-79	7-5671
1 11 $\frac{1}{4}$	6 2 $\frac{1}{4}$	443-014	3-0722	3 1 $\frac{1}{2}$	9 9 $\frac{1}{2}$	1104-46	7-6691
1 11 $\frac{3}{8}$	6 3	447-690	3-1081	3 1 $\frac{3}{8}$	9 10 $\frac{1}{8}$	1119-24	7-7791
2 0	6 3 $\frac{1}{2}$	452-390	3-1418	3 2	9 11 $\frac{1}{2}$	1134-12	7-8681
2 0 $\frac{1}{4}$	6 4	461-864	3-2075	3 2 $\frac{1}{4}$	10 0 $\frac{1}{4}$	1149-09	7-9791
2 0 $\frac{1}{2}$	6 4 $\frac{1}{2}$	471-436	3-2731	3 2 $\frac{1}{2}$	10 0 $\frac{1}{2}$	1164-16	8-0846
2 0 $\frac{3}{4}$	6 5	481-106	3-3410	3 2 $\frac{3}{4}$	10 1 $\frac{1}{4}$	1179-32	8-1891
2 1	6 6 $\frac{1}{2}$	490-875	3-4081	3 3	10 2 $\frac{1}{2}$	1194-59	8-2951
2 1 $\frac{1}{4}$	6 7 $\frac{1}{4}$	500-741	3-4775	3 3 $\frac{1}{4}$	10 3 $\frac{1}{4}$	1209-95	8-4026
2 1 $\frac{1}{2}$	6 8 $\frac{1}{2}$	510-706	3-5468	3 3 $\frac{1}{2}$	10 4	1225-42	8-5091
2 1 $\frac{3}{4}$	6 8 $\frac{3}{4}$	520-769	3-6101	3 3 $\frac{3}{4}$	10 4 $\frac{1}{2}$	1240-98	8-6171
2 2	6 9 $\frac{1}{2}$	530-930	3-6870	3 4	10 5 $\frac{1}{2}$	1256-64	8-7269
2 2 $\frac{1}{4}$	6 10 $\frac{1}{4}$	541-189	3-7583	3 4 $\frac{1}{4}$	10 6 $\frac{1}{4}$	1272-39	8-8361
2 2 $\frac{1}{2}$	6 11 $\frac{1}{2}$	551-547	3-8302	3 4 $\frac{1}{2}$	10 7 $\frac{1}{4}$	1288-25	8-9462
2 2 $\frac{3}{4}$	7 0	562-002	3-9042	3 4 $\frac{3}{4}$	10 8	1304-20	9-0561
2 3	7 0 $\frac{1}{2}$	572-556	3-9761	3 5	10 8 $\frac{1}{2}$	1320-25	9-1686
2 3 $\frac{1}{4}$	7 1	583-208	4-0500	3 5 $\frac{1}{4}$	10 9 $\frac{1}{4}$	1336-40	9-2112
2 3 $\frac{1}{2}$	7 2	593-958	4-1241	3 5 $\frac{1}{2}$	10 10 $\frac{1}{4}$	1352-65	9-3936
2 3 $\frac{3}{4}$	7 3	604-807	4-2000	3 5 $\frac{3}{4}$	10 11 $\frac{1}{4}$	1369-00	9-5061
2 4	7 3 $\frac{1}{2}$	615-753	4-2760	3 6	10 11 $\frac{1}{2}$	1385-44	9-6212
2 4 $\frac{1}{4}$	7 4 $\frac{1}{4}$	626-798	4-3521	3 6 $\frac{1}{4}$	11 0 $\frac{1}{4}$	1401-98	9-7364
2 4 $\frac{1}{2}$	7 5 $\frac{1}{2}$	637-941	4-4302	3 6 $\frac{1}{2}$	11 1 $\frac{1}{4}$	1418-62	9-8518
2 4 $\frac{3}{4}$	7 6 $\frac{1}{4}$	649-182	4-5083	3 6 $\frac{3}{4}$	11 2 $\frac{1}{4}$	1435-36	9-9671
2 5	7 7	660-521	4-5861	3 7	11 3	1452-20	10-084
2 5 $\frac{1}{4}$	7 7 $\frac{1}{4}$	671-958	4-6665	3 7 $\frac{1}{4}$	11 3 $\frac{1}{4}$	1469-14	10-202
2 5 $\frac{1}{2}$	7 8	683-494	4-7467	3 7 $\frac{1}{2}$	11 4 $\frac{1}{4}$	1486-17	10-320
2 5 $\frac{3}{4}$	7 9 $\frac{1}{4}$	695-128	4-8274	3 7 $\frac{3}{4}$	11 5 $\frac{1}{4}$	1503-30	10-439
2 6	7 10 $\frac{1}{4}$	706-860	4-9081	3 8	11 6 $\frac{1}{4}$	1520-53	10-559
2 6 $\frac{1}{4}$	7 11	718-690	4-9901	3 8 $\frac{1}{4}$	11 7	1537-86	10-679
2 6 $\frac{1}{2}$	7 11 $\frac{1}{2}$	730-618	5-0731	3 8 $\frac{1}{2}$	11 7 $\frac{1}{4}$	1555-28	10-800
2 6 $\frac{3}{4}$	8 0	742-644	5-1573	3 8 $\frac{3}{4}$	11 8 $\frac{1}{4}$	1572-81	10-922
2 7	8 1	754-769	5-2278	3 9	11 9	1590-43	11-044
2 7 $\frac{1}{4}$	8 2	766-992	5-3264	3 9 $\frac{1}{4}$	11 10 $\frac{1}{4}$	1608-15	11-167
2 7 $\frac{1}{2}$	8 2 $\frac{1}{2}$	779-313	5-4112	3 9 $\frac{1}{2}$	11 10 $\frac{1}{2}$	1625-97	11-291
2 7 $\frac{3}{4}$	8 3 $\frac{1}{4}$	791-732	5-4982	3 9 $\frac{3}{4}$	11 11 $\frac{1}{4}$	1643-89	11-415
2 8	8 4 $\frac{1}{4}$	804-249	5-5850	3 10	12 0 $\frac{1}{4}$	1661-90	11-534
2 8 $\frac{1}{4}$	8 5	816-865	5-6729	3 10 $\frac{1}{4}$	12 1 $\frac{1}{4}$	1680-02	11-666
2 8 $\frac{1}{2}$	8 6	829-578	5-7601	3 10 $\frac{1}{2}$	12 2	1698-23	11-793
2 8 $\frac{3}{4}$	8 6 $\frac{1}{4}$	842-390	5-8491	3 10 $\frac{3}{4}$	12 2 $\frac{1}{4}$	1716-54	11-920
2 9	8 7	855-300	5-9398	3 11	12 3	1734-94	12-048
2 9 $\frac{1}{4}$	8 8	868-308	6-0291	3 11 $\frac{1}{4}$	12 4	1753-45	12-176
2 9 $\frac{1}{2}$	8 9	881-415	6-1201	3 11 $\frac{1}{2}$	12 5 $\frac{1}{4}$	1772-05	12-305
2 9 $\frac{3}{4}$	8 10	894-619	6-2129	3 11 $\frac{3}{4}$	12 6	1790-76	12-435
2 10	8 10 $\frac{3}{4}$	907-922	6-3051	4 0	12 6 $\frac{1}{4}$	1809-56	12-566
2 10 $\frac{1}{4}$	8 11	921-323	6-3981	4 0 $\frac{1}{4}$	12 7 $\frac{1}{4}$	1828-46	12-697
2 10 $\frac{1}{2}$	9 0	934-822	6-4911	4 0 $\frac{1}{2}$	12 8 $\frac{1}{4}$	1847-45	12-829
2 10 $\frac{3}{4}$	9 1	948-419	6-5863	4 0 $\frac{3}{4}$	12 9 $\frac{1}{4}$	1866-55	12-962
2 11	9 1 $\frac{1}{4}$	962-115	6-6815	4 1	12 9	1885-74	13-095
2 11 $\frac{1}{4}$	9 2	975-908	6-7772	4 1 $\frac{1}{4}$	12 10 $\frac{1}{4}$	1905-03	13-229
2 11 $\frac{1}{2}$	9 3	989-800	6-8738	4 1 $\frac{1}{2}$	12 11 $\frac{1}{4}$	1924-42	13-364
2 11 $\frac{3}{4}$	9 4	1003-79	6-9701	4 1 $\frac{3}{4}$	13 0 $\frac{1}{4}$	1943-91	13-499

Diam. in inches.	Circum. in feet. in.	Area in square in.	Area in square ft.	Diam. in inches.	Circum. in feet. in.	Area in square in.	Area in square ft.
4 2	13 1	1963.50	13.635	5 4	16 9	3216.99	22.333
4 2 $\frac{1}{4}$	13 1 $\frac{1}{4}$	1983.18	13.772	5 4 $\frac{1}{4}$	16 9 $\frac{1}{4}$	3242.17	22.515
4 2 $\frac{1}{2}$	13 2	2002.96	13.909	5 4 $\frac{1}{2}$	16 10	3267.46	22.621
4 2 $\frac{3}{4}$	13 3	2022.84	14.047	5 4 $\frac{3}{4}$	16 11	3292.83	22.866
4 3	13 4 $\frac{1}{4}$	2042.82	14.186	5 5	17 0 $\frac{1}{4}$	3318.31	23.043
4 3 $\frac{1}{4}$	13 5	2062.90	14.325	5 5 $\frac{1}{4}$	17 0 $\frac{1}{2}$	3343.88	23.221
4 3 $\frac{1}{2}$	13 5 $\frac{1}{4}$	2083.07	14.465	5 5 $\frac{1}{2}$	17 1	3369.56	23.330
4 3 $\frac{3}{4}$	13 6 $\frac{1}{4}$	2103.35	14.606	5 5 $\frac{3}{4}$	17 2 $\frac{1}{4}$	3395.33	23.578
4 4	13 7 $\frac{3}{4}$	2123.72	14.748	5 6	17 3 $\frac{1}{4}$	3421.20	23.758
4 4 $\frac{1}{4}$	13 8 $\frac{1}{4}$	2144.19	14.890	5 6 $\frac{1}{4}$	17 4 $\frac{1}{4}$	3447.16	23.938
4 4 $\frac{1}{2}$	13 8 $\frac{1}{2}$	2164.75	15.033	5 6 $\frac{1}{2}$	17 4 $\frac{1}{2}$	3473.23	24.119
4 4 $\frac{3}{4}$	13 9 $\frac{1}{4}$	2185.42	15.176	5 6 $\frac{3}{4}$	17 5 $\frac{1}{4}$	3499.39	24.301
4 5	13 10 $\frac{1}{4}$	2206.18	15.320	5 7	17 6 $\frac{1}{4}$	3525.66	24.483
4 5 $\frac{1}{4}$	13 11 $\frac{1}{4}$	2227.05	15.465	5 7 $\frac{1}{4}$	17 7 $\frac{1}{4}$	3552.01	24.666
4 5 $\frac{1}{2}$	14 0	2248.01	15.611	5 7 $\frac{1}{2}$	17 8	3578.47	24.850
4 5 $\frac{3}{4}$	14 0 $\frac{1}{4}$	2269.06	15.757	5 7 $\frac{3}{4}$	17 8 $\frac{1}{4}$	3605.03	25.034
4 6	14 1 $\frac{1}{4}$	2290.22	15.904	5 8	17 9 $\frac{1}{4}$	3631.68	25.220
4 6 $\frac{1}{4}$	14 2 $\frac{1}{4}$	2311.48	16.051	5 8 $\frac{1}{4}$	17 10 $\frac{1}{4}$	3658.44	25.405
4 6 $\frac{1}{2}$	14 3 $\frac{1}{4}$	2332.83	16.200	5 8 $\frac{1}{2}$	17 11 $\frac{1}{4}$	3685.29	25.592
4 6 $\frac{3}{4}$	14 4	2354.28	16.349	5 8 $\frac{3}{4}$	17 11 $\frac{3}{4}$	3712.24	25.779
4 7	14 4 $\frac{3}{4}$	2375.83	16.498	5 9	18 0 $\frac{1}{4}$	3739.28	25.964
4 7 $\frac{1}{4}$	14 5 $\frac{1}{4}$	2397.48	16.649	5 9 $\frac{1}{4}$	18 1 $\frac{1}{4}$	3766.43	26.155
4 7 $\frac{1}{2}$	14 6 $\frac{1}{4}$	2419.22	16.800	5 9 $\frac{1}{2}$	18 2 $\frac{1}{4}$	3793.67	26.344
4 7 $\frac{3}{4}$	14 7 $\frac{1}{4}$	2441.07	16.951	5 9 $\frac{3}{4}$	18 3 $\frac{1}{4}$	3821.02	26.534
4 8	14 7 $\frac{3}{4}$	2463.01	17.104	5 10	18 3 $\frac{3}{4}$	3848.46	26.725
4 8 $\frac{1}{4}$	14 8 $\frac{1}{4}$	2485.05	17.257	5 10 $\frac{1}{4}$	18 4 $\frac{1}{4}$	3875.99	26.916
4 8 $\frac{1}{2}$	14 9 $\frac{1}{4}$	2507.19	17.411	5 10 $\frac{1}{2}$	18 5 $\frac{1}{4}$	3903.63	27.108
4 8 $\frac{3}{4}$	14 10 $\frac{1}{4}$	2529.42	17.565	5 10 $\frac{3}{4}$	18 6 $\frac{1}{4}$	3931.36	27.301
4 9	14 11	2551.76	17.720	5 11	18 7	3959.20	27.494
4 9 $\frac{1}{4}$	14 11 $\frac{1}{4}$	2574.19	17.876	5 11 $\frac{1}{4}$	18 7 $\frac{1}{4}$	3987.13	27.688
4 9 $\frac{1}{2}$	15 0	2596.72	18.033	5 11 $\frac{1}{2}$	18 8 $\frac{1}{4}$	4015.16	27.883
4 9 $\frac{3}{4}$	15 1	2619.35	18.189	5 11 $\frac{3}{4}$	18 9 $\frac{1}{4}$	4043.28	28.078
4 10	15 2 $\frac{1}{4}$	2642.08	18.347	6 0	18 10 $\frac{1}{4}$	4071.51	28.274
4 10 $\frac{1}{4}$	15 2 $\frac{1}{2}$	2664.91	18.506	6 0 $\frac{1}{4}$	18 10 $\frac{1}{2}$	4099.83	28.471
4 10 $\frac{1}{2}$	15 3 $\frac{1}{4}$	2687.83	18.665	6 0 $\frac{1}{2}$	18 11 $\frac{1}{4}$	4128.25	28.668
4 10 $\frac{3}{4}$	15 4 $\frac{1}{4}$	2710.85	18.825	6 0 $\frac{3}{4}$	19 0 $\frac{1}{4}$	4156.77	28.866
4 11	15 5 $\frac{1}{4}$	2733.97	18.985	6 1	19 1 $\frac{1}{4}$	4185.39	29.065
4 11 $\frac{1}{4}$	15 6 $\frac{1}{4}$	2757.19	19.147	6 1 $\frac{1}{4}$	19 2 $\frac{1}{4}$	4214.11	29.264
4 11 $\frac{1}{2}$	15 6 $\frac{1}{2}$	2780.51	19.309	6 1 $\frac{1}{2}$	19 2 $\frac{1}{2}$	4242.92	29.466
4 11 $\frac{3}{4}$	15 7 $\frac{1}{4}$	2803.92	19.471	6 1 $\frac{3}{4}$	19 3 $\frac{1}{4}$	4271.83	29.665
5 0	15 8 $\frac{1}{4}$	2827.44	19.635	6 2	19 4 $\frac{1}{4}$	4300.85	29.867
5 0 $\frac{1}{4}$	15 9 $\frac{1}{4}$	2851.05	19.798	6 2 $\frac{1}{4}$	19 5 $\frac{1}{4}$	4329.95	30.069
5 0 $\frac{1}{2}$	15 10	2874.76	19.963	6 2 $\frac{1}{2}$	19 6	4359.16	30.271
5 0 $\frac{3}{4}$	15 10 $\frac{1}{4}$	2898.56	20.128	6 2 $\frac{3}{4}$	19 6 $\frac{1}{4}$	4388.47	30.475
5 1	15 11 $\frac{1}{4}$	2922.47	20.294	6 3	19 7 $\frac{1}{4}$	4417.87	30.679
5 1 $\frac{1}{4}$	16 0 $\frac{1}{4}$	2946.47	20.461	6 3 $\frac{1}{4}$	19 8 $\frac{1}{4}$	4447.37	30.884
5 1 $\frac{1}{2}$	16 1 $\frac{1}{4}$	2970.57	20.629	6 3 $\frac{1}{2}$	19 9 $\frac{1}{4}$	4476.97	31.090
5 1 $\frac{3}{4}$	16 1 $\frac{3}{4}$	2994.77	20.797	6 3 $\frac{3}{4}$	19 9 $\frac{3}{4}$	4506.67	31.296
5 2	16 2 $\frac{1}{4}$	3019.07	20.965	6 4	19 10 $\frac{1}{4}$	4536.47	31.503
5 2 $\frac{1}{4}$	16 3 $\frac{1}{4}$	3043.47	21.135	6 4 $\frac{1}{4}$	19 11 $\frac{1}{4}$	4566.36	31.710
5 2 $\frac{1}{2}$	16 4 $\frac{1}{4}$	3067.96	21.305	6 4 $\frac{1}{2}$	20 0 $\frac{1}{4}$	4596.35	31.919
5 2 $\frac{3}{4}$	16 5 $\frac{1}{4}$	3092.56	21.476	6 4 $\frac{3}{4}$	20 1 $\frac{1}{4}$	4626.44	32.114
5 3	16 5 $\frac{3}{4}$	3117.25	21.647	6 5	20 1 $\frac{1}{2}$	4656.63	32.337
5 3 $\frac{1}{4}$	16 6 $\frac{1}{4}$	3142.04	21.819	6 5 $\frac{1}{4}$	20 2 $\frac{1}{4}$	4686.92	32.548
5 3 $\frac{1}{2}$	16 7 $\frac{1}{4}$	3166.92	21.992	6 5 $\frac{1}{2}$	20 3 $\frac{1}{4}$	4717.30	32.759
5 3 $\frac{3}{4}$	16 8 $\frac{1}{4}$	3191.91	22.166	6 5 $\frac{3}{4}$	20 4 $\frac{1}{4}$	4747.79	32.970

Diam.		Circum.	Area.	Side of equal Square.	Diam.		Circum.	Area.	Side of equal Square.			
feet.	in.	feet.	in.	feet.	feet.	in.	feet.	feet.	in.			
6		18	10 $\frac{1}{2}$	28-274	5	3 $\frac{1}{2}$	11	34	6 $\frac{5}{8}$	95-033	9	8 $\frac{1}{2}$
	1	19	1 $\frac{1}{2}$	29-065	5	4 $\frac{5}{8}$	1	34	9 $\frac{1}{2}$	96-478	9	9 $\frac{1}{8}$
	2	19	4 $\frac{1}{2}$	29-867	5	5 $\frac{1}{2}$	2	35	0 $\frac{7}{8}$	97-934	9	10 $\frac{1}{2}$
	3	19	7 $\frac{5}{8}$	30-679	5	6 $\frac{1}{4}$	3	35	4 $\frac{1}{4}$	99-402	9	11 $\frac{1}{4}$
	4	19	10 $\frac{3}{4}$	31-503	5	7 $\frac{1}{4}$	4	35	7 $\frac{1}{2}$	100-879	10	0 $\frac{1}{4}$
	5	20	1 $\frac{7}{8}$	32-337	5	8 $\frac{1}{4}$	5	35	10 $\frac{3}{4}$	102-368	10	1 $\frac{1}{2}$
	6	20	5	33-183	5	9 $\frac{1}{8}$	6	36	1 $\frac{1}{2}$	103-869	10	2 $\frac{1}{2}$
	7	20	8 $\frac{1}{2}$	34-039	5	10 $\frac{1}{2}$	7	36	4 $\frac{1}{4}$	105-379	10	3 $\frac{3}{4}$
	8	20	11 $\frac{1}{4}$	34-906	5	10 $\frac{7}{8}$	8	36	7 $\frac{1}{2}$	106-901	10	4
	9	21	2	35-784	5	11 $\frac{1}{8}$	9	36	10 $\frac{7}{8}$	108-434	10	5
	10	21	5 $\frac{1}{4}$	36-674	6	0 $\frac{1}{8}$	10	37	2 $\frac{1}{2}$	109-977	10	5 $\frac{7}{8}$
	11	21	8 $\frac{1}{4}$	37-573	6	1 $\frac{1}{2}$	11	37	5 $\frac{1}{4}$	111-531	10	6 $\frac{1}{4}$
7		21	11 $\frac{7}{8}$	38-484	6	2 $\frac{1}{8}$	12	37	8 $\frac{1}{2}$	113-097	10	7 $\frac{1}{8}$
	1	22	3	39-406	6	3 $\frac{3}{8}$	1	37	11 $\frac{1}{2}$	114-673	10	8 $\frac{1}{8}$
	2	22	6 $\frac{1}{2}$	40-338	6	4 $\frac{1}{4}$	2	38	2 $\frac{1}{2}$	116-260	10	9 $\frac{1}{8}$
	3	22	9 $\frac{1}{4}$	41-282	6	5	3	38	5 $\frac{1}{4}$	117-859	10	10 $\frac{1}{2}$
	4	23	0 $\frac{1}{2}$	42-236	6	6	4	38	8 $\frac{1}{2}$	119-467	10	11 $\frac{1}{2}$
	5	23	2 $\frac{1}{4}$	43-202	6	6 $\frac{7}{8}$	5	39	0	121-087	11	0
	6	23	6 $\frac{1}{4}$	44-178	6	7 $\frac{1}{8}$	6	39	3 $\frac{1}{4}$	122-718	11	0 $\frac{1}{2}$
	7	23	11	45-165	6	8 $\frac{1}{8}$	7	39	6 $\frac{1}{4}$	124-359	11	1 $\frac{1}{8}$
	8	24	1 $\frac{1}{2}$	46-163	6	9 $\frac{1}{8}$	8	39	9 $\frac{1}{4}$	126-012	11	2
	9	24	4 $\frac{1}{4}$	47-173	6	10 $\frac{1}{8}$	9	40	0 $\frac{3}{4}$	127-676	11	3
	10	24	7 $\frac{1}{4}$	48-192	6	11 $\frac{1}{8}$	10	40	3 $\frac{1}{4}$	129-350	11	4 $\frac{1}{2}$
	11	24	10 $\frac{1}{8}$	49-223	7	0 $\frac{1}{4}$	11	40	6 $\frac{1}{8}$	131-036	11	5 $\frac{1}{2}$
8		25	1 $\frac{1}{2}$	50-265	7	0 $\frac{1}{2}$	13	40	10	132-732	11	6 $\frac{1}{4}$
	1	25	4 $\frac{1}{4}$	51-317	7	1 $\frac{1}{4}$	1	41	1 $\frac{1}{2}$	134-439	11	7 $\frac{1}{4}$
	2	25	7 $\frac{1}{4}$	52-381	7	2 $\frac{1}{4}$	2	41	4 $\frac{1}{4}$	136-157	11	8 $\frac{1}{4}$
	3	25	11	53-456	7	3 $\frac{1}{4}$	3	41	7 $\frac{1}{2}$	137-886	11	8 $\frac{3}{4}$
	4	26	2 $\frac{1}{4}$	54-541	7	4 $\frac{1}{4}$	4	41	10 $\frac{1}{4}$	139-626	11	9 $\frac{1}{4}$
	5	26	5 $\frac{1}{4}$	55-637	7	5 $\frac{1}{4}$	5	42	1 $\frac{1}{4}$	141-377	11	10 $\frac{1}{4}$
	6	26	8 $\frac{1}{4}$	56-745	7	6 $\frac{1}{4}$	6	42	4 $\frac{1}{4}$	143-139	11	11 $\frac{1}{4}$
	7	26	11 $\frac{1}{4}$	57-862	7	7 $\frac{1}{4}$	7	42	8	144-911	12	0 $\frac{1}{2}$
	8	27	2 $\frac{1}{4}$	58-992	7	8 $\frac{1}{4}$	8	42	11 $\frac{1}{4}$	146-694	12	1 $\frac{1}{4}$
	9	27	5 $\frac{1}{4}$	60-132	7	9 $\frac{1}{4}$	9	43	2 $\frac{1}{4}$	148-489	12	2 $\frac{1}{4}$
	10	27	9	61-282	7	9 $\frac{7}{8}$	10	43	5 $\frac{1}{4}$	150-294	12	3 $\frac{1}{4}$
	11	28	0 $\frac{1}{2}$	62-444	7	10 $\frac{1}{4}$	11	43	8 $\frac{1}{4}$	152-110	12	4
9		28	3 $\frac{1}{4}$	63-617	7	11 $\frac{1}{8}$	14	43	11 $\frac{1}{4}$	153-938	12	4 $\frac{1}{2}$
	1	28	6 $\frac{1}{4}$	64-800	8	0 $\frac{1}{2}$	1	44	2 $\frac{1}{8}$	155-775	12	5 $\frac{1}{2}$
	2	28	9 $\frac{1}{4}$	65-995	8	1 $\frac{1}{2}$	2	44	6	157-625	12	6 $\frac{1}{2}$
	3	29	0	67-200	8	2 $\frac{1}{2}$	3	44	9 $\frac{1}{4}$	159-485	12	7 $\frac{1}{4}$
	4	29	3 $\frac{1}{4}$	68-416	8	3 $\frac{1}{4}$	4	45	0 $\frac{1}{4}$	161-355	12	8 $\frac{1}{4}$
	5	29	7	69-644	8	4 $\frac{1}{4}$	5	45	3 $\frac{1}{4}$	163-237	12	9 $\frac{1}{4}$
	6	29	10 $\frac{1}{4}$	70-882	8	5	6	45	6 $\frac{1}{4}$	165-130	12	10 $\frac{1}{4}$
	7	30	1 $\frac{1}{4}$	72-130	8	5 $\frac{1}{4}$	7	45	9 $\frac{1}{4}$	167-033	12	11 $\frac{1}{4}$
	8	30	4 $\frac{1}{4}$	73-391	8	6 $\frac{1}{4}$	8	46	0 $\frac{1}{2}$	168-947	13	0
	9	30	7 $\frac{1}{4}$	74-662	8	7 $\frac{1}{4}$	9	46	4	170-873	13	1 $\frac{1}{4}$
	10	30	11 $\frac{1}{4}$	75-943	8	8 $\frac{1}{4}$	10	46	7 $\frac{1}{4}$	172-809	13	1 $\frac{3}{4}$
	11	31	1 $\frac{3}{4}$	77-236	8	9 $\frac{1}{2}$	11	46	11 $\frac{1}{4}$	174-756	13	2 $\frac{1}{2}$
10		31	5	78-540	8	10 $\frac{1}{4}$	15	47	1 $\frac{1}{2}$	176-715	13	3 $\frac{1}{4}$
	1	31	8 $\frac{1}{4}$	79-854	8	11 $\frac{1}{4}$	1	47	4 $\frac{1}{4}$	178-683	13	4 $\frac{1}{4}$
	2	31	11 $\frac{1}{4}$	81-179	9	0 $\frac{1}{2}$	2	47	7 $\frac{1}{4}$	180-663	13	5 $\frac{1}{4}$
	3	32	2 $\frac{1}{4}$	82-516	9	1	3	47	10 $\frac{1}{4}$	182-654	13	6 $\frac{1}{4}$
	4	32	5 $\frac{1}{4}$	83-862	9	1 $\frac{1}{4}$	4	48	2 $\frac{1}{4}$	184-655	13	7 $\frac{1}{4}$
	5	32	8 $\frac{1}{4}$	85-221	9	2 $\frac{1}{4}$	5	48	5 $\frac{1}{4}$	186-668	13	8
	6	32	11 $\frac{1}{4}$	86-590	9	3 $\frac{1}{4}$	6	48	8 $\frac{1}{4}$	188-692	13	8 $\frac{1}{2}$
	7	33	2 $\frac{1}{4}$	87-969	9	4 $\frac{1}{4}$	7	48	11 $\frac{1}{4}$	190-726	13	9 $\frac{1}{4}$
	8	33	6 $\frac{1}{4}$	89-360	9	5 $\frac{1}{4}$	8	49	2 $\frac{1}{4}$	192-771	13	10 $\frac{1}{4}$
	9	33	9 $\frac{1}{4}$	90-762	9	6 $\frac{1}{4}$	9	49	5 $\frac{1}{4}$	194-828	13	11 $\frac{1}{4}$
	10	34	0 $\frac{1}{2}$	92-174	9	7 $\frac{1}{4}$	10	49	8 $\frac{1}{4}$	196-894	14	0 $\frac{1}{2}$
	11	34	3 $\frac{1}{4}$	93-598	9	8 $\frac{1}{4}$	11	50	0	198-973	14	1 $\frac{1}{4}$

Diam.		Circum.		Area.		Side of equal Square.		Diam.		Circum.		Area.		Side of equal Square.	
feet.	in.	feet.	in.	feet.	feet.	in.	in.	feet.	in.	feet.	in.	feet.	feet.	in.	in.
16		50	3 $\frac{1}{2}$	201-062	14	2 $\frac{1}{2}$		21		65	11 $\frac{1}{2}$	346-361	18	7 $\frac{1}{2}$	
	1	50	6 $\frac{1}{2}$	203-161	14	3			1	66	2 $\frac{1}{2}$	349-114	18	8 $\frac{1}{2}$	
	2	50	9 $\frac{1}{2}$	205-272	14	3 $\frac{1}{2}$			2	66	5 $\frac{1}{2}$	351-880	18	9 $\frac{1}{2}$	
	3	51	0 $\frac{1}{2}$	207-394	14	4			3	66	9	354-657	18	10	
	4	51	3 $\frac{1}{2}$	209-526	14	5			4	67	0 $\frac{1}{2}$	357-443	18	10 $\frac{1}{2}$	
	5	51	6 $\frac{1}{2}$	211-670	14	6			5	67	3 $\frac{1}{2}$	360-241	18	11 $\frac{1}{2}$	
	6	51	10	213-825	14	7			6	67	6 $\frac{1}{2}$	363-051	19	0	
	7	52	1 $\frac{1}{2}$	215-989	14	8			7	67	9 $\frac{1}{2}$	365-869	19	1 $\frac{1}{2}$	
	8	52	4 $\frac{1}{2}$	218-166	14	9 $\frac{1}{2}$			8	68	0 $\frac{1}{2}$	368-701	19	2 $\frac{1}{2}$	
	9	52	7 $\frac{1}{2}$	220-353	14	10 $\frac{1}{2}$			9	68	3 $\frac{1}{2}$	371-543	19	3 $\frac{1}{2}$	
	10	52	10 $\frac{1}{2}$	222-551	14	11			10	68	7	374-394	19	4 $\frac{1}{2}$	
	11	53	1 $\frac{1}{2}$	224-760	14	11 $\frac{1}{2}$			11	68	10 $\frac{1}{2}$	377-258	19	5 $\frac{1}{2}$	
17		53	4 $\frac{1}{2}$	226-980	15	0 $\frac{1}{2}$		22		69	1 $\frac{1}{2}$	380-133	19	5 $\frac{1}{2}$	
	1	53	8	229-210	15	1 $\frac{1}{2}$			1	69	4 $\frac{1}{2}$	383-017	19	6 $\frac{1}{2}$	
	2	53	11 $\frac{1}{2}$	231-462	15	2 $\frac{1}{2}$			2	69	7 $\frac{1}{2}$	385-914	19	7 $\frac{1}{2}$	
	3	54	2	233-705	15	3 $\frac{1}{2}$			3	69	10 $\frac{1}{2}$	388-822	19	8 $\frac{1}{2}$	
	4	54	5	235-968	15	4			4	70	1 $\frac{1}{2}$	391-738	19	9 $\frac{1}{2}$	
	5	54	8 $\frac{1}{2}$	238-243	15	5 $\frac{1}{2}$			5	70	5	394-668	19	10 $\frac{1}{2}$	
	6	54	11 $\frac{1}{2}$	240-528	15	6 $\frac{1}{2}$			6	70	8 $\frac{1}{2}$	397-608	19	11 $\frac{1}{2}$	
	7	55	2	242-824	15	7			7	70	11 $\frac{1}{2}$	400-558	20	0 $\frac{1}{2}$	
	8	55	6	245-131	15	7 $\frac{1}{2}$			8	71	2 $\frac{1}{2}$	403-520	20	1 $\frac{1}{2}$	
	9	55	9 $\frac{1}{2}$	247-450	15	8 $\frac{1}{2}$			9	71	5 $\frac{1}{2}$	406-493	20	2 $\frac{1}{2}$	
	10	56	0 $\frac{1}{2}$	249-778	15	9 $\frac{1}{2}$			10	71	8 $\frac{1}{2}$	409-475	20	2 $\frac{1}{2}$	
	11	56	3 $\frac{1}{2}$	252-118	15	10 $\frac{1}{2}$			11	71	11 $\frac{1}{2}$	412-470	20	3 $\frac{1}{2}$	
18		56	6 $\frac{1}{2}$	254-469	15	11 $\frac{1}{2}$		23		72	3	415-476	20	4 $\frac{1}{2}$	
	1	56	9 $\frac{1}{2}$	256-830	16	0 $\frac{1}{2}$			1	72	6 $\frac{1}{2}$	418-491	20	5 $\frac{1}{2}$	
	2	57	0 $\frac{1}{2}$	259-203	16	1 $\frac{1}{2}$			2	72	9 $\frac{1}{2}$	421-519	20	6 $\frac{1}{2}$	
	3	57	4	261-587	16	2 $\frac{1}{2}$			3	73	0 $\frac{1}{2}$	424-557	20	7 $\frac{1}{2}$	
	4	57	7 $\frac{1}{2}$	263-980	16	3 $\frac{1}{2}$			4	73	3 $\frac{1}{2}$	427-605	20	8 $\frac{1}{2}$	
	5	57	10 $\frac{1}{2}$	266-386	16	3 $\frac{1}{2}$			5	73	6 $\frac{1}{2}$	430-665	20	9 $\frac{1}{2}$	
	6	58	1 $\frac{1}{2}$	268-803	16	4 $\frac{1}{2}$			6	73	9 $\frac{1}{2}$	433-737	20	10	
	7	58	4 $\frac{1}{2}$	271-229	16	5 $\frac{1}{2}$			7	74	1	436-817	20	10 $\frac{1}{2}$	
	8	58	7 $\frac{1}{2}$	273-667	16	6 $\frac{1}{2}$			8	74	4 $\frac{1}{2}$	439-910	20	11 $\frac{1}{2}$	
	9	58	10	276-117	16	7 $\frac{1}{2}$			9	74	7 $\frac{1}{2}$	443-014	21	0	
	10	59	2	278-576	16	8 $\frac{1}{2}$			10	74	10 $\frac{1}{2}$	446-127	21	1 $\frac{1}{2}$	
	11	59	5	281-047	16	9 $\frac{1}{2}$			11	75	1 $\frac{1}{2}$	449-253	21	2 $\frac{1}{2}$	
19		59	8 $\frac{1}{2}$	283-529	16	10		24		75	4 $\frac{1}{2}$	452-390	21	3 $\frac{1}{2}$	
	1	59	11 $\frac{1}{2}$	286-021	16	11			1	75	7 $\frac{1}{2}$	455-536	21	4 $\frac{1}{2}$	
	2	60	2 $\frac{1}{2}$	288-524	16	11 $\frac{1}{2}$			2	75	11	458-694	21	5	
	3	60	5 $\frac{1}{2}$	291-039	17	0 $\frac{1}{2}$			3	76	2 $\frac{1}{2}$	461-864	21	6	
	4	60	8 $\frac{1}{2}$	293-564	17	1 $\frac{1}{2}$			4	76	5 $\frac{1}{2}$	465-042	21	6 $\frac{1}{2}$	
	5	60	11 $\frac{1}{2}$	296-110	17	2 $\frac{1}{2}$			5	76	8 $\frac{1}{2}$	468-234	21	7 $\frac{1}{2}$	
	6	61	3 $\frac{1}{2}$	298-648	17	3 $\frac{1}{2}$			6	76	11 $\frac{1}{2}$	471-436	21	8 $\frac{1}{2}$	
	7	61	6 $\frac{1}{2}$	301-205	17	4 $\frac{1}{2}$			7	77	2 $\frac{1}{2}$	474-647	21	9 $\frac{1}{2}$	
	8	61	9 $\frac{1}{2}$	303-774	17	5 $\frac{1}{2}$			8	77	5 $\frac{1}{2}$	477-871	21	10	
	9	62	0 $\frac{1}{2}$	306-355	17	6			9	77	9	481-106	21	11 $\frac{1}{2}$	
	10	62	3 $\frac{1}{2}$	308-944	17	7			10	78	0 $\frac{1}{2}$	484-350	22	0 $\frac{1}{2}$	
	11	62	6 $\frac{1}{2}$	311-546	17	7 $\frac{1}{2}$			11	78	3 $\frac{1}{2}$	487-607	22	1	
20		62	9 $\frac{1}{2}$	314-160	17	8 $\frac{1}{2}$		25		78	6 $\frac{1}{2}$	490-875	22	1 $\frac{1}{2}$	
	1	63	1 $\frac{1}{2}$	316-782	17	9			1	78	9 $\frac{1}{2}$	494-151	22	2 $\frac{1}{2}$	
	2	63	4 $\frac{1}{2}$	319-417	17	10 $\frac{1}{2}$			2	79	0 $\frac{1}{2}$	497-441	22	3 $\frac{1}{2}$	
	3	63	7 $\frac{1}{2}$	322-063	17	11 $\frac{1}{2}$			3	79	3 $\frac{1}{2}$	500-741	22	4 $\frac{1}{2}$	
	4	63	11 $\frac{1}{2}$	324-718	18	0 $\frac{1}{2}$			4	79	7 $\frac{1}{2}$	504-051	22	5 $\frac{1}{2}$	
	5	64	1 $\frac{1}{2}$	327-385	18	1 $\frac{1}{2}$			5	79	11 $\frac{1}{2}$	507-373	22	6 $\frac{1}{2}$	
	6	64	4 $\frac{1}{2}$	330-064	18	2			6	80	1 $\frac{1}{2}$	510-706	22	7 $\frac{1}{2}$	
	7	64	7 $\frac{1}{2}$	332-752	18	2 $\frac{1}{2}$			7	80	4 $\frac{1}{2}$	514-048	22	8 $\frac{1}{2}$	
	8	64	11	335-452	18	3 $\frac{1}{2}$			8	80	7 $\frac{1}{2}$	517-403	22	9	
	9	65	2 $\frac{1}{2}$	338-163	18	4 $\frac{1}{2}$			9	80	10 $\frac{1}{2}$	520-769	22	9 $\frac{1}{2}$	
	10	65	5 $\frac{1}{2}$	340-884	18	5 $\frac{1}{2}$			10	81	1 $\frac{1}{2}$	524-144	22	10 $\frac{1}{2}$	
	11	65	8 $\frac{1}{2}$	343-617	18	6 $\frac{1}{2}$			11	81	5	527-531	22	11	

TABLE

OF

SQUARES, CUBES, SQUARE AND CUBE ROOTS OF NUMBERS.

No.	Squares.	Cubes.	Square Roots.	Cube Roots.	Reciprocals.
1	1	1	1.000000	1.000000	.10000000
2	4	8	1.4142136	1.2599210	.50000000
3	9	27	1.7320508	1.4422496	.33333333
4	16	64	2.0000000	1.5874011	.25000000
5	25	125	2.2360680	1.7099759	.20000000
6	36	216	2.4494897	1.8171206	.16666667
7	49	343	2.6457513	1.9129312	.14285714
8	64	512	2.8284271	2.0000000	.12500000
9	81	729	3.0000000	2.0800837	.11111111
10	100	1000	3.1622777	2.1544347	.10000000
11	121	1331	3.3166248	2.2239801	.09090909
12	144	1728	3.4641016	2.2894286	.08333333
13	169	2197	3.6055513	2.3513347	.07692307
14	196	2744	3.7416574	2.4101422	.07142857
15	225	3375	3.8729833	2.4662121	.06666667
16	256	4096	4.0000000	2.5198421	.06250000
17	289	4913	4.1231056	2.5712816	.05882352
18	324	5832	4.2426407	2.6207414	.05555556
19	361	6859	4.3588989	2.6684016	.05263157
20	400	8000	4.4721360	2.7144177	.05000000
21	441	9261	4.5825757	2.7589243	.04761904
22	484	10648	4.6904158	2.8020393	.04545454
23	529	12167	4.7958315	2.8438670	.04347826
24	576	13824	4.8989795	2.8844991	.04166667
25	625	15625	5.0000000	2.9240177	.04000000
26	676	17576	5.0990195	2.9624960	.03846153
27	729	19683	5.1961524	3.0000000	.03703703
28	784	21952	5.2915026	3.0365889	.03571428
29	841	24389	5.3851648	3.0723168	.03448275
30	900	27000	5.4772256	3.1072325	.03333333
31	961	29791	5.5677644	3.1413806	.03225806
32	1024	32768	5.6568542	3.1748021	.03125000
33	1089	35937	5.7445626	3.2075343	.03030303
34	1156	39304	5.8309519	3.2396118	.02941176
35	1225	42875	5.9160798	3.2710663	.02857142
36	1296	46656	6.0000000	3.3019272	.02777778
37	1369	50653	6.0827625	3.3322218	.02702702
38	1444	54872	6.1644140	3.3619754	.02631579
39	1521	59319	6.2449980	3.3912114	.02564102
40	1600	64000	6.3245553	3.4199519	.02500000
41	1681	68921	6.4031242	3.4482172	.02439024
42	1764	74088	6.4807407	3.4760266	.02380952
43	1849	79507	6.5574385	3.5033981	.02325581
44	1936	85184	6.6332496	3.5303483	.02272727
45	2025	91125	6.7082039	3.5568933	.02222222
46	2116	97336	6.7823300	3.5830479	.02173913
47	2209	103823	6.8556546	3.6088261	.02127660
48	2304	110592	6.9282032	3.6342411	.02083333
49	2401	117649	7.0000000	3.6593957	.02040816
50	2500	125000	7.0710678	3.6840314	.02000000

No.	Squares.	Cubes.	Square Roots.	Cube Roots.	Reciprocals.
51	2601	132051	7.1414284	3.7084298	.019607843
52	2704	140608	7.2111026	3.7325111	.019230769
53	2809	148877	7.2801099	3.7562858	.018867925
54	2916	157464	7.3484692	3.7797631	.018518519
55	3025	166375	7.4161985	3.8029525	.018181818
56	3136	175616	7.4833148	3.8258624	.017857143
57	3249	185193	7.5498344	3.8485011	.017543860
58	3364	195112	7.6157731	3.8708766	.017241379
59	3481	205379	7.6811457	3.8929965	.016949153
60	3600	216000	7.7459667	3.9148676	.016666667
61	3721	226981	7.8102497	3.9304972	.016393443
62	3844	238328	7.8740079	3.9578915	.016129032
63	3969	250047	7.9372539	3.9790571	.015873016
64	4096	262144	8.0000000	4.0000000	.015625000
65	4225	274625	8.0622577	4.0207256	.015384615
66	4356	287496	8.1240384	4.0412401	.015151515
67	4489	300763	8.1853528	4.0615480	.014925373
68	4624	314432	8.2462113	4.0816551	.014705882
69	4761	328509	8.3066239	4.1015661	.014492754
70	4900	343000	8.3666003	4.1212853	.014285714
71	5041	357911	8.4261498	4.1408178	.014084517
72	5184	373248	8.4852814	4.1601676	.013888889
73	5329	389017	8.5440037	4.1793390	.013698630
74	5476	405224	8.6023253	4.1983364	.013513514
75	5625	421875	8.6602540	4.2171633	.013333333
76	5776	438976	8.7177979	4.2358236	.013157895
77	5929	456533	8.7749644	4.2543210	.012987013
78	6084	474552	8.8317609	4.2726586	.012820513
79	6241	493039	8.8881944	4.2908404	.012658228
80	6400	512000	8.9442719	4.3088695	.012500000
81	6561	531441	9.0000000	4.3267487	.012345679
82	6724	551368	9.0553851	4.3444815	.012195122
83	6889	571787	9.1104336	4.3620707	.012048193
84	7056	592704	9.1651514	4.3795191	.011904762
85	7225	614125	9.2195445	4.3968296	.011764706
86	7396	636056	9.2736185	4.4140049	.011627907
87	7569	658503	9.3273791	4.4310476	.011494253
88	7744	681472	9.3808315	4.4470692	.011363636
89	7921	704969	9.4339811	4.4647451	.011235955
90	8100	729000	9.4868330	4.4814047	.011111111
91	8281	753571	9.5393920	4.4979414	.010989011
92	8464	778688	9.5916630	4.5143574	.010869565
93	8649	804357	9.6436508	4.5306549	.010752688
94	8836	830584	9.6953597	4.5468359	.010638298
95	9025	857374	9.7467943	4.5629026	.010526316
96	9216	884736	9.7979590	4.5788570	.010416667
97	9409	912673	9.8488578	4.5947009	.010309278
98	9604	941192	9.8994949	4.6104363	.010204082
99	9801	970299	9.9498744	4.6260650	.010101010
100	10000	1000000	10.0000000	4.6415888	.010000000
101	10201	1030301	10.0498756	4.6570095	.009900990
102	10404	1061208	10.0995049	4.6723287	.009803922
103	10609	1092727	10.1488916	4.6875482	.009708738
104	10816	1124864	10.1980390	4.7026694	.009615385
105	11025	1157625	10.2469508	4.7176940	.009523810
106	11236	1191016	10.2956301	4.7326235	.009433962
107	11449	1225043	10.3440804	4.7474594	.009345794
108	11664	1259712	10.3923048	4.7622032	.009259259
109	11881	1295029	10.4403065	4.7768562	.009174312
110	12100	1331000	10.4880885	4.7914199	.009090909
111	12321	1367631	10.5356538	4.8058995	.009009009
112	12544	1404928	10.5830052	4.8202845	.008928571

No.	Squares.	Cubes.	Square Roots.	Cube Roots.	Reciprocals.
113	12769	1442897	10.6301458	4.8345881	.008849558
114	12996	1481544	10.6770783	4.8488076	.008771930
115	13225	1520875	10.7238053	4.8629442	.008695652
116	13456	1560896	10.7703296	4.8769990	.008620690
117	13689	1601613	10.8166538	4.8909732	.008547009
118	13924	1643032	10.8627805	4.9048681	.008474576
119	14161	1685159	10.9087121	4.9186847	.008403361
120	14400	1728000	10.9544512	4.9324242	.008333333
121	14641	1771561	11.0000000	4.9460874	.008264463
122	14884	1815848	11.0453610	4.9596757	.008196721
123	15129	1860867	11.0905365	4.9731898	.008130081
124	15376	1906624	11.1355287	4.9866310	.008064516
125	15625	1953125	11.1803399	5.0000000	.008000000
126	15876	2000376	11.2249722	5.0132979	.007936508
127	16129	2048383	11.2694277	5.0265257	.007874016
128	16384	2097152	11.3137085	5.0396842	.007812500
129	16641	2146689	11.3578167	5.0527743	.007751938
130	16900	2197000	11.4017543	5.0657970	.007692308
131	17161	2248091	11.4455231	5.0787531	.007633588
132	17424	2299968	11.4891253	5.0916434	.007575758
133	17689	2352637	11.5325626	5.1044637	.007518797
134	17956	2406104	11.5758369	5.1172299	.007462687
135	18225	2460375	11.6189500	5.1299278	.007407407
136	18496	2515456	11.6619038	5.1425632	.007352941
137	18769	2571353	11.7046999	5.1551367	.007299270
138	19044	2628072	11.7473444	5.1676493	.007246377
139	19321	2685619	11.7898261	5.1801015	.007194245
140	19600	2744000	11.8321596	5.1924941	.007142857
141	19881	2803221	11.8743421	5.2048279	.007092199
142	20164	2863288	11.9163753	5.2171034	.007042254
143	20449	2924207	11.9582607	5.2293215	.006993007
144	20736	2985984	12.0000000	5.2414828	.006944444
145	21025	3048625	12.0415946	5.2535879	.006896552
146	21316	3112136	12.0830460	5.2656374	.006849315
147	21609	3176523	12.1243557	5.2776321	.006802721
148	21904	3241792	12.1655251	5.2895725	.006756757
149	22201	3307949	12.2065556	5.3014592	.006711409
150	22500	3375000	12.2474487	5.3132928	.006666667
151	22801	3442951	12.2882057	5.3250740	.006622517
152	23104	3511008	12.3288290	5.3368033	.006578947
153	23409	3581577	12.3693169	5.3484812	.006535948
154	23716	3652264	12.4096736	5.3601084	.006493506
155	24025	3723875	12.4498996	5.3716854	.006451613
156	24336	3796416	12.4899960	5.3832126	.006410256
157	24649	3869893	12.5299641	5.3946907	.006369427
158	24964	3944312	12.5698051	5.4061202	.006329114
159	25281	4019679	12.6095202	5.4175015	.006289308
160	25600	4096000	12.6491106	5.4288352	.006250000
161	25921	4173281	12.6885775	5.4401218	.006211180
162	26244	4251528	12.7279221	5.4513618	.006172840
163	26569	4330747	12.7671453	5.4625556	.006134969
164	26896	4410944	12.8062485	5.4737037	.006097561
165	27225	4492125	12.8452326	5.4848066	.006060606
166	27556	4574296	12.8840937	5.4958647	.006024096
167	27889	4657463	12.9228480	5.5068784	.005988024
168	28224	4741632	12.9614814	5.5178484	.005952381
169	28561	4826809	13.0000000	5.5287748	.005917160
170	28900	4913000	13.0384048	5.5396583	.005882353
171	29241	5000211	13.0766968	5.5504991	.005847953
172	29584	5088448	13.1148770	5.5612978	.005813953
173	29929	5177717	13.1529464	5.5720546	.005780347
174	30276	5268024	13.1909060	5.5827702	.005747126

No.	Squares.	Cubes.	Square Roots.	Cube Roots.	Reciprocals.
175	30625	5359375	13-2287566	5-5934447	·005714286
176	30976	5451776	13-2364992	5-6040787	·005681818
177	31329	5545233	13-3041347	5-6146724	·005649718
178	31684	5639752	13-3416641	5-6252263	·005617978
179	32041	5735339	13-3790882	5-6357408	·005586592
180	32400	5832000	13-4164079	5-6462162	·005555556
181	32761	5929741	13-4536240	5-6566528	·005524862
182	33124	6028568	13-4907376	5-6670511	·005494505
183	33489	6128487	13-5277493	5-6774114	·005464481
184	33856	6229504	13-6646600	5-6877349	·005434783
185	34225	6331625	13-6014705	5-6980192	·005405405
186	34596	6434856	13-6381817	5-7082675	·005376344
187	34969	6539203	13-6747943	5-7184791	·005347594
188	35344	6644672	13-7113092	5-7286543	·005319149
189	35721	6751269	13-7477271	5-7387936	·005291005
190	36100	6859000	13-7840488	5-7488971	·005263158
191	36481	6967871	13-8202750	5-7589652	·005235602
192	36864	7077888	13-8564065	5-7689982	·005208333
193	37249	7189517	13-8924400	5-7789966	·005181347
194	37636	7301384	13-9283883	5-7889604	·005154639
195	38025	7414875	13-9642400	5-7988900	·005128205
196	38416	7529536	14-0000000	5-8087857	·005102041
197	38809	7645373	14-0356688	5-8186479	·005076142
198	39204	7762392	14-0712473	5-8284867	·005050505
199	39601	7880599	14-1067360	5-8382725	·005025126
200	40000	8000000	14-1421356	5-8480355	·005000000
201	40401	8120601	14-1774469	5-8577660	·004975124
202	40804	8242408	14-2126704	5-8674673	·004950495
203	41209	8365427	14-2478068	5-8771307	·004926108
204	41616	8489664	14-2828569	5-8867653	·004901961
205	42025	8615125	14-3178211	5-8963685	·004878049
206	42436	8741816	14-3527001	5-9059406	·004854369
207	42849	8869743	14-3874946	5-9154817	·004830918
208	43264	8998912	14-4222051	5-9249921	·004807692
209	43681	9129329	14-4568323	5-9344721	·004784689
210	44100	9261000	14-4913767	5-9439220	·004761905
211	44521	9393931	14-5258390	5-9533418	·004739336
212	44944	9528128	14-5602198	5-9627320	·004716981
213	45369	9663597	14-5945195	5-9720926	·004694836
214	45796	9800344	14-6287388	5-9814240	·004672897
215	46225	9938375	14-6628783	5-9907264	·004651163
216	46656	10077696	14-6969385	6-0000000	·004629630
217	47089	10218312	14-7309199	6-0092450	·004608295
218	47524	10360232	14-7648231	6-0184617	·004587156
219	47961	10503459	14-7986486	6-0276502	·004566212
220	48400	10648000	14-8323970	6-0368107	·004545455
221	48841	10793861	14-8660687	6-0459435	·004524887
222	49284	10941048	14-8996644	6-0550489	·004504505
223	49729	11089567	14-9331845	6-0641270	·004484305
224	50176	11239424	14-9666295	6-0731779	·004464286
225	50625	11390625	15-0000000	6-0824620	·004444444
226	51076	11543176	15-0332964	6-0991994	·004424279
227	51529	11697083	15-0665192	6-1001702	·004405286
228	51984	11852352	15-0996689	6-1091147	·004385965
229	52441	12008989	15-1327460	6-1180332	·004366812
230	52900	12167000	15-1657509	6-1269257	·004347826
231	53361	12326391	15-1986842	6-1357924	·004329004
232	53824	12487168	15-2315462	6-1446337	·004310345
233	54289	12649337	15-2643375	6-1534495	·004291845
234	54756	12812994	15-2970585	6-1622401	·004273504
235	55225	12977875	15-3297097	6-1710058	·004255319
236	55696	13144256	15-3622915	6-1797466	·004237288

No.	Squares.	Cubes.	Square Roots.	Cube Roots.	Reciprocals.
237	56169	13312053	15-3948043	6-1884628	·004219409
238	56644	13481272	15-4272486	6-1971544	·004201681
239	57121	13651919	15-4596248	6-2058218	·004184100
240	57600	13824000	15-4919334	6-2144650	·004166667
241	58081	13997521	15-5241747	6-2230843	·004149378
242	58564	14172488	15-5563492	6-2316797	·004132231
243	59049	14348907	15-5884573	6-2402515	·004115226
244	59536	14526784	15-6204994	6-2487993	·004098361
245	60025	14706125	15-6524758	6-2573248	·004081633
246	60516	14886936	15-6843871	6-2658266	·004065041
247	61009	15069223	15-7162336	6-2743054	·004048583
248	61504	15252992	15-7480157	6-2827613	·004032258
249	62001	15438249	15-7797338	6-2911946	·004016064
250	62500	15625000	15-8113383	6-2996053	·004000000
251	63001	15813251	15-8429795	6-3079935	·003984064
252	63504	16003008	15-8745079	6-3163596	·003968254
253	64009	16194277	15-9059737	6-3247035	·003952569
254	64516	16387064	15-9373775	6-3330256	·003937008
255	65025	16581375	15-9687194	6-3413257	·003921569
256	65536	16777216	16-0000000	6-3496042	·003906250
257	66049	16974593	16-0312195	6-3578611	·003891051
258	66564	17173512	16-0623784	6-3660968	·003875969
259	67081	17373979	16-0934769	6-3743111	·003861004
260	67600	17576000	16-1245155	6-3825043	·003846154
261	68121	17779581	16-1554944	6-3906765	·003831418
262	68644	17984728	16-1864141	6-3988279	·003816794
263	69169	18191447	16-2172747	6-4069585	·003802231
264	69696	18399744	16-2480768	6-4150687	·003787879
265	70225	18609625	16-2788206	6-4231583	·003773585
266	70756	18821096	16-3095064	6-4312276	·003759398
267	71289	19034163	16-3401346	6-4392767	·003745318
268	71824	19248832	16-3707055	6-4473057	·003731343
269	72361	19465109	16-4012195	6-4553148	·003717472
270	72900	19683000	16-4316767	6-4633041	·003703704
271	73441	19902511	16-4620776	6-4712736	·003690037
272	73984	20123643	16-4924225	6-4792236	·003676471
273	74529	20346417	16-5227116	6-4871541	·003663004
274	75076	20570824	16-5529454	6-4950653	·003649635
275	75625	20796875	16-5831240	6-5029572	·003636364
276	76176	21024576	16-6132477	6-5108300	·003623138
277	76729	21253933	16-6433170	6-5186839	·003610108
278	77284	21484952	16-6733320	6-5265189	·003597122
279	77841	21717639	16-7032931	6-5343351	·003584220
280	78400	21952000	16-7332005	6-5421326	·003571429
281	78961	22188041	16-7630546	6-5499116	·003558719
282	79524	22425768	16-7928556	6-5576722	·003546099
283	80089	22665187	16-8226038	6-5654144	·003533569
284	80656	22906304	16-8522995	6-5731385	·003521127
285	81225	23149125	16-8819430	6-5808443	·003508772
286	81796	23393656	16-9115345	6-5885323	·003496593
287	82369	23639903	16-9410743	6-5962023	·003484321
288	82944	23887872	16-9705627	6-6038545	·003472222
289	83521	24137569	17-0000000	6-6114890	·003460203
290	84100	24389000	17-0293864	6-6191060	·003448276
291	84681	24642171	17-0587221	6-6267054	·003436426
292	85264	24897088	17-0880075	6-6342874	·003424658
293	85849	25153757	17-1172428	6-6418522	·003412960
294	86436	25412184	17-1464282	6-6493998	·003401361
295	87025	25672375	17-1755640	6-6569362	·003389831
296	87616	25934836	17-2046595	6-6644437	·003378378
297	88209	26198073	17-2336879	6-6719403	·003367003
298	88804	26463592	17-2626765	6-6794200	·003355705

No.	Squares.	Cubes.	Square Roots.	Cube Roots.	Reciprocals.
299	89401	26730899	17-2916165	6-6868831	·003344482
300	90000	27000000	17-3205081	6-6943295	·003333333
301	90601	27270901	17-3493516	6-7017593	·003322259
302	91204	27543608	17-3781472	6-7091729	·003311258
303	91809	27818127	17-4068952	6-7165700	·003301330
304	92416	28094464	17-4355958	6-7239508	·003289474
305	93025	28372625	17-4642492	6-7313155	·003278689
306	93636	28652616	17-4928557	6-7386641	·003267974
307	94249	28934443	17-5214155	6-7459967	·003257329
308	94864	29218112	17-5499288	6-7533134	·003246753
309	95481	29503609	17-5783958	6-7606143	·003236246
310	96100	29791000	17-6068169	6-7678995	·003225806
311	96721	30080231	17-6351921	6-7751690	·003215434
312	97344	30371328	17-6635217	6-7824229	·003205128
313	97969	30664297	17-6918060	6-7896613	·003194888
314	98596	30959144	17-7200451	6-7968844	·003184713
315	99225	31255875	17-7482393	6-8040921	·003174603
316	99856	31554496	17-7763888	6-8112847	·003164557
317	100489	31855013	17-8044938	6-8184620	·003154574
318	101124	32157432	17-8325545	6-8256242	·003144654
319	101761	32461759	17-8605711	6-8327714	·003134796
320	102400	32768000	17-8885438	6-8399037	·003125000
321	103041	33076161	17-9164729	6-8470213	·003115265
322	103684	33386248	17-9443584	6-8541240	·003105590
323	104329	33698267	17-9722008	6-8612120	·003095975
324	104976	34012224	18-0000000	6-8682855	·003086420
325	105625	34328125	18-0277564	6-8753433	·003076923
326	106276	34645976	18-0554701	6-8823888	·003067485
327	106929	34965783	18-0831413	6-8894188	·003058104
328	107584	35287552	18-1107703	6-8964345	·003048780
329	108241	35611289	18-1383571	6-9034359	·003039514
330	108900	35937000	18-1659021	6-9104232	·003030303
331	109561	36264691	18-1934054	6-9173964	·003021148
332	110224	36594368	18-2208672	6-9243556	·003012048
333	110889	36926037	18-2482876	6-9313088	·003003003
334	111556	37259704	18-2756669	6-9382321	·002994012
335	112225	37595375	18-3030052	6-9451496	·002985075
336	112896	37933056	18-3303028	6-9520533	·002976190
337	113569	38272753	18-3575598	6-9589434	·002967359
338	114244	38614472	18-3847763	6-9658198	·002958580
339	114921	38958219	18-4119526	6-9726826	·002949853
340	115600	39304000	18-4390889	6-9795321	·002941176
341	116281	39651821	18-4661853	6-9863681	·002932551
342	116964	40001688	18-4932420	6-9931906	·002923977
343	117649	40353607	18-5202592	7-0000000	·002915452
344	118336	40707584	18-5472370	7-0067962	·002906977
345	119025	41063625	18-5741756	7-0135791	·002898551
346	119716	41421736	18-6010752	7-0203490	·002890173
347	120409	41781923	18-6279360	7-0271058	·002881844
348	121104	42144192	18-6547581	7-0338497	·002873563
349	121801	42508549	18-6815417	7-0405860	·002865330
350	122500	42875000	18-7082869	7-0472987	·002857143
351	123201	43243551	18-7349940	7-0540041	·002849003
352	123904	43614208	18-7616630	7-0606967	·002840909
353	124609	43986977	18-7882942	7-0673767	·002832861
354	125316	44361864	18-8148877	7-0740440	·002824859
355	126025	44738875	18-8414437	7-0806988	·002816901
356	126736	45118016	18-8679623	7-0873411	·002808989
357	127449	45499293	18-8944436	7-0939709	·002801120
358	128164	45882712	18-9208879	7-1005885	·002793296
359	128881	46268279	18-9472953	7-1071937	·002785515
360	129600	46656000	18-9736660	7-1137866	·002777778

No.	Squares.	Cubes.	Square Roots.	Cube Roots.	Reciprocals.
361	130321	47045831	19.0000000	7.1203674	.002770083
362	131044	47437928	19.0262976	7.1209360	.002762431
363	131769	47832147	19.0525589	7.1334925	.002754821
364	132496	48228544	19.0787840	7.1400370	.002747253
365	133225	48627125	19.1049732	7.1465695	.002739726
366	133956	49027896	19.1311265	7.1530901	.002732240
367	134689	49430863	19.1572441	7.1595988	.002724796
368	135424	49836032	19.1833261	7.1660957	.002717391
369	136161	50243409	19.2093727	7.1725809	.002710027
370	136900	50653000	19.2353841	7.1790544	.002702703
371	137641	51064811	19.2613603	7.1855162	.002695418
372	138384	51478848	19.2873015	7.1919663	.002688172
373	139129	51895117	19.3132079	7.1984050	.002680965
374	139876	52313624	19.3390796	7.2048332	.002673797
375	140625	52734375	19.3649167	7.2112479	.002666667
376	141376	53157376	19.3907194	7.2176522	.002659574
377	142129	53582633	19.4164878	7.2240450	.002652520
378	142884	54010152	19.4422221	7.2304268	.002645503
379	143641	54439939	19.4679223	7.2367972	.002638521
380	144400	54872000	19.4935887	7.2431565	.002631579
381	145161	55306341	19.5192213	7.2495045	.002624672
382	145924	55742968	19.5448203	7.2558415	.002617801
383	146689	56181887	19.5703858	7.2621675	.002610966
384	147456	56623104	19.5959179	7.2684824	.002604167
385	148225	57066625	19.6214169	7.2747864	.002597403
386	148996	57512456	19.6468827	7.2810794	.002590674
387	149769	57960603	19.6723156	7.2873617	.002583979
388	150544	58411072	19.6977156	7.2936330	.002577320
389	151321	58863869	19.7230829	7.2998936	.002570694
390	152100	59319000	19.7484177	7.3061436	.002564103
391	152881	59776471	19.7737199	7.3123828	.002557545
392	153664	60236228	19.7989899	7.3186114	.002551020
393	154449	60698457	19.8242276	7.3248295	.002544529
394	155236	61162934	19.8494332	7.3310369	.002538071
395	156025	61629875	19.8746069	7.3372339	.002531646
396	156816	62099136	19.8997487	7.3434205	.002525253
397	157609	62570773	19.9248588	7.3495966	.002518892
398	158404	63044792	19.9499373	7.3557624	.002512563
399	159201	63521199	19.9749844	7.3619178	.002506266
400	160000	64000000	20.0000000	7.3680630	.002500000
401	160801	64481201	20.0249844	7.3741979	.002493766
402	161604	64964808	20.0499377	7.3803227	.002487562
403	162409	65450827	20.0748599	7.3864373	.002481390
404	163216	65939264	20.0997512	7.3925418	.002475248
405	164025	66430125	20.1246118	7.3986363	.002469136
406	164836	66923416	20.1494417	7.4047206	.002463054
407	165649	67419143	20.1742410	7.4107950	.002457002
408	166464	67917312	20.1990099	7.4168595	.002450980
409	167281	68417929	20.2237484	7.4229142	.002444988
410	168100	68921900	20.2484567	7.4289589	.002439024
411	168921	69426331	20.2731349	7.4349938	.002433090
412	169744	69934528	20.2977831	7.4410189	.002427184
413	170569	70444997	20.3224014	7.4470342	.002421308
414	171396	70957944	20.3469899	7.4530399	.002415459
415	172225	71473375	20.3715488	7.4590359	.002409639
416	173056	71991296	20.3960781	7.4650223	.002403846
417	173889	72511713	20.4205779	7.4709991	.002398082
418	174724	73034632	20.4450483	7.4769664	.002392344
419	175561	73560059	20.4694895	7.4829242	.002386635
420	176400	74088000	20.4939015	7.4888724	.002380952
421	177241	74618461	20.5182845	7.4948113	.002375297
422	178084	75151448	20.5426386	7.5007406	.002369668

No.	Squares.	Cubes.	Square Roots.	Cube Roots.	Reciprocals.
423	178929	75686967	20-5669638	7-5066607	·002364066
424	179776	76225024	20-5912603	7-5125715	·002358491
425	180625	76765625	20-6155281	7-5184730	·002352941
426	181476	77308776	20-6397674	7-5243652	·002347418
427	182329	77854483	20-6639783	7-5302482	·002341920
428	183184	78402752	20-6881609	7-5361221	·002336449
429	184041	78953589	20-7123152	7-5419867	·002331002
430	184900	79507000	20-7364414	7-5478423	·002325581
431	185761	80062991	20-7605395	7-5536888	·002320186
432	186624	80621568	20-7846097	7-5595263	·002314815
433	187489	81182737	20-8086520	7-5653548	·002309469
434	188356	81746504	20-8326667	7-5711743	·002304147
435	189225	82312875	20-8566536	7-5769849	·002298851
436	190096	82881836	20-8806130	7-5827865	·002293578
437	190969	83453453	20-9045450	7-5885793	·002288330
438	191844	84027672	20-9284495	7-5943633	·002283105
439	192721	84604519	20-9523268	7-6001385	·002277904
440	193600	85184000	20-9761770	7-6059049	·002272727
441	194481	85766121	21-0000600	7-6116626	·002267574
442	195364	86350888	21-0237960	7-6174116	·002262443
443	196249	86938307	21-0475652	7-6231519	·002257336
444	197136	87528384	21-0713075	7-6288837	·002252252
445	198025	88121125	21-0950231	7-6346067	·002247191
446	198916	88716536	21-1187121	7-6403213	·002242152
447	199809	89314623	21-1423745	7-6460272	·002237136
448	200704	89915392	21-1660105	7-6517247	·002232143
449	201601	90518849	21-1896201	7-6574138	·002227171
450	202500	91125000	21-2132034	7-6630943	·002222222
451	203401	91733851	21-2367606	7-6687665	·002217295
452	204304	92345408	21-2602916	7-6744303	·002212389
453	205209	92959677	21-2837967	7-6800857	·002207506
454	206116	93576664	21-3072758	7-6857328	·002202643
455	207025	94196375	21-3307290	7-6913717	·002197802
456	207936	94818816	21-3541565	7-6970023	·002192982
457	208849	95443993	21-3775583	7-7026246	·002188184
458	209764	96071912	21-4009346	7-7082338	·002183406
459	210681	96702579	21-4242853	7-7138448	·002178649
460	211600	97336000	21-4476106	7-7194426	·002173913
461	212521	97972181	21-4709106	7-7250325	·002169197
462	213444	98611128	21-4941853	7-7306141	·002164502
463	214369	99252847	21-5174348	7-7361877	·002159827
464	215296	99897344	21-5406592	7-7417532	·002155172
465	216225	100544625	21-5638587	7-7473109	·002150538
466	217156	101194696	21-5870331	7-7528606	·002145923
467	218089	101847563	21-6101828	7-7584023	·002141328
468	219024	102503232	21-6333077	7-7639361	·002136752
469	219961	103161709	21-6564078	7-7694620	·002132196
470	220900	103823000	21-6794834	7-7749801	·002127660
471	221841	104487111	21-7025344	7-7804904	·002123142
472	222784	105154048	21-7255610	7-7859928	·002118644
473	223729	105828817	21-7485632	7-7914875	·002114165
474	224676	106496424	21-7715411	7-7969745	·002109705
475	225625	107171875	21-7944947	7-8024538	·002105263
476	226576	107850176	21-8174242	7-8079254	·002100840
477	227529	108531333	21-8403297	7-8133892	·002096486
478	228484	109215352	21-8632111	7-8188456	·002092050
479	229441	109902239	21-8860686	7-8242942	·002087683
480	230400	110592000	21-9089023	7-8297353	·002083333
481	231361	111284641	21-9317122	7-8351688	·002079002
482	232324	111980168	21-9544984	7-8405949	·002074689
483	233289	112678587	21-9772610	7-8460134	·002070393
484	234256	113379904	22-0000000	7-8514244	·002066116

No.	Squares.	Cubes.	Square Roots.	Cube Roots.	Reciprocals.
485	235225	114084125	22 0227155	7 8568281	002061856
486	236196	114791256	22 0454077	7 8622242	002057613
487	237169	115501303	22 0680765	7 8676130	002053388
488	238144	116214272	22 0907220	7 8729944	002049180
489	239121	116930169	22 1133444	7 8783684	002044990
490	240100	117649000	22 1359436	7 8837352	002040816
491	241081	118370771	22 1585198	7 8890946	002036660
492	242064	119095488	22 1810730	7 8944468	002032520
493	243049	119823157	22 2036033	7 8997917	002028338
494	244036	1205533784	22 2261108	7 9051294	002024291
495	245025	121287375	22 2485955	7 9104599	002020292
496	246016	122023936	22 2710575	7 9157832	002016129
497	247009	122763473	22 2934968	7 9210994	002012072
498	248004	123505992	22 3159136	7 9264085	002008032
499	249001	124251499	22 3383079	7 9317104	002004008
500	250000	125000000	22 3606798	7 9370053	002000000
501	251001	125751501	22 3830293	7 9422931	001996008
502	252004	126506008	22 4053565	7 9475739	001992032
503	253009	127263527	22 4276615	7 9528477	001988072
504	254016	128024064	22 4499443	7 9581144	001984127
505	255025	128787625	22 4722051	7 9633743	001980198
506	256036	129554216	22 4944438	7 9686271	001976235
507	257049	130323843	22 5166605	7 9738731	001972387
508	258064	131096512	22 5388553	7 9791122	001968504
509	259081	131872329	22 5610283	7 9843444	001964637
510	260100	132651000	22 5831796	7 9894697	001960785
511	261121	133432831	22 6053091	7 9947883	001956947
512	262144	134217728	22 6274170	8 0000000	001953125
513	263169	135005697	22 6495033	8 0052049	001949318
514	264196	135796744	22 6715681	8 0104032	001945525
515	265225	136590875	22 6936114	8 0155946	001941748
516	266256	137388096	22 7156334	8 0207794	001937984
517	267289	138188413	22 7376341	8 0259574	001934236
518	268324	138991832	22 7596134	8 0311287	001930502
519	269361	139798359	22 7815715	8 0362935	001926782
520	270400	140608000	22 8035085	8 0414515	001923077
521	271441	141420761	22 8254244	8 0466030	001919386
522	272484	142236648	22 8473193	8 0517479	001915709
523	273529	143055667	22 8691933	8 0568862	001912046
524	274576	1438777824	22 8910463	8 0620180	001908397
525	275625	144703125	22 9128785	8 0671432	001904762
526	276676	145531576	22 9346899	8 0722629	001901141
527	277729	146363183	22 9564806	8 0773743	001897533
528	278784	147197952	22 9782506	8 0824800	001893939
529	279841	148035889	23 0000000	8 0875794	001890359
530	280900	148877001	23 0217239	8 0926723	001886792
531	281961	149721291	23 0434372	8 0977589	001883239
532	283024	150568768	23 0651252	8 1028390	001879699
533	284089	151419437	23 0867928	8 1079128	001876173
534	285156	152273304	23 1084400	8 1129803	001872659
535	286225	153130375	23 1300670	8 1180414	001869159
536	287296	153990656	23 1516738	8 1230962	001865672
537	288369	154854153	23 1732605	8 1281447	001862197
538	289444	155720872	23 1948270	8 1331870	001858736
539	290521	156590819	23 2163735	8 1382230	001855288
540	291600	157464000	23 2379001	8 1432529	001851852
541	292681	158340421	23 2594067	8 1482765	001848429
542	293764	159220088	23 2808935	8 1532939	001845018
543	294849	160103007	23 3023604	8 1583051	001841621
544	295936	160990184	23 3238076	8 1633102	001838235
545	297025	161878625	23 3452351	8 1683092	001834862
546	298116	162771336	23 3666429	8 1733029	001831502

No.	Squares.	Cubes.	Square Roots.	Cube Roots.	Reciprocals.
547	299209	163667323	23-3880311	8-1782888	·001628154
548	300304	164566532	23-40939J8	8-1832695	·001824818
549	301401	165469149	23-4307490	8-1882441	·001821494
550	302500	166375000	23-4520788	8-1932127	·001818182
551	303601	167284151	23-4733892	8-1981753	·001814882
552	304704	168196608	23-4946802	8-2031319	·001811594
553	305809	169112377	23-5159520	8-2080825	·001808318
554	306916	170031454	23-5372046	8-2130271	·001805054
555	308025	170953875	23-5584330	8-2179657	·001801802
556	309136	171879616	23-5796522	8-2228985	·001798561
557	310249	172808693	23-6008474	8-2278254	·001795332
558	311364	173741112	23-6220236	8-2327463	·001792115
559	312481	174676879	23-6431808	8-2376614	·001788909
560	313600	175616000	23-6643191	8-2425706	·001785714
561	314721	176558481	23-6854386	8-2474740	·001782531
562	315844	177504328	23-7065392	8-2523715	·001779359
563	316969	178453547	23-7276210	8-2572635	·001776199
564	318096	179406144	23-7486842	8-2621492	·001773050
565	319225	180362125	23-7697236	8-2670294	·001769912
566	320356	181321496	23-7907545	8-2719039	·001766784
567	321489	182284293	23-8117618	8-2767726	·001763668
568	322624	183250432	23-8327596	8-2816255	·001760563
569	323761	184220099	23-8537209	8-2864928	·001757469
570	324900	185193009	23-8746728	8-2913444	·001754386
571	326041	186169411	23-8956033	8-2961903	·001751313
572	327184	187149248	23-9165215	8-3010304	·001748252
573	328329	188132517	23-9374184	8-3058651	·001745201
574	329476	189119224	23-9582971	8-3106941	·001742160
575	330625	190109375	23-9791576	8-3155175	·001739130
576	331776	191102976	24-0000000	8-3203353	·001736111
577	332927	192100033	24-0208243	8-3251475	·001733102
578	334084	193100552	24-0416206	8-3299542	·001730104
579	335241	194104539	24-0624188	8-3347553	·001727116
580	336400	195112900	24-0831891	8-3395509	·001724138
581	337561	196122941	24-1039416	8-3443410	·001721170
582	338724	197137368	24-1246762	8-3491256	·001718213
583	339889	198155287	24-1453929	8-3539047	·001715266
584	341056	199176704	24-1660919	8-3586784	·001712329
585	342225	200201625	24-1867732	8-3634466	·001709402
586	343396	201230056	24-2074369	8-3682095	·001706485
587	344569	202262093	24-2280829	8-3729668	·001703578
588	345744	203297472	24-2487113	8-3777188	·001700680
589	346921	204336469	24-2693222	8-3824653	·001697793
590	348100	205379000	24-2899156	8-3872065	·001694915
591	349281	206425071	24-3104996	8-3919428	·001692047
592	350464	207474688	24-3310501	8-3966729	·001689189
593	351649	208527857	24-3515913	8-4013981	·001686341
594	352836	209584584	24-3721152	8-4061180	·001683502
595	354025	210644875	24-3926218	8-4108326	·001680672
596	355216	211708736	24-4131112	8-4155419	·001677852
597	356409	212776173	24-4335834	8-4202460	·001675042
598	357604	213847192	24-4540385	8-4249448	·001672241
599	358801	214921799	24-4744765	8-4296383	·001669449
600	360000	216009009	24-4948974	8-4343267	·001666667
601	361201	217081801	24-5153013	8-4390098	·001663894
602	362404	218167208	24-5356883	8-4436877	·001661130
603	363609	219256227	24-5560583	8-4483605	·001658375
604	364816	220348864	24-5764115	8-4530281	·001655629
605	366025	221445125	24-5967478	8-4576906	·001652893
606	367236	222545016	24-6170673	8-4623479	·001650165
607	368449	223648543	24-6373700	8-4670001	·001647446
608	369664	224755712	24-6576560	8-4716471	·001644737

No.	Squares.	Cubes.	Square Roots.	Cube Roots.	Reciprocals.
609	370881	225866529	24-6779254	8-4762892	·001642036
610	372100	226981000	24-6981781	8-4809261	·001639344
611	373321	228099131	24-7184142	8-4855579	·001636661
612	374544	229220928	25-7386338	8-4901848	·001633987
613	375769	230346397	24-7588368	8-4948065	·001631321
614	376996	231475544	24-7790234	8-4994233	·001628664
615	378225	232608375	24-7991935	8-5040350	·001626016
616	379456	233744896	24-8193473	8-5086417	·001623377
617	380689	234885113	24-8394847	8-5132435	·001620746
618	381924	236029032	24-8596058	8-5178403	·001618123
619	383161	237176659	24-8797106	8-5224331	·001615509
620	384400	238328000	24-8997992	8-5270189	·001612903
621	385641	239483061	24-9198716	8-5316009	·001610306
622	386884	240641848	24-9399278	8-5361780	·001607717
623	388129	241804367	24-9599679	8-5407501	·001605136
624	389376	242970624	24-9799920	8-5453173	·001602564
625	390625	244140625	25-0000000	8-5498797	·001600000
626	391876	245314376	25-0199920	8-5544372	·001597444
627	393129	246491883	25-0399681	8-5589899	·001594896
628	394384	247673152	25-0599282	8-5635377	·001592357
629	395641	248858189	25-0798724	8-5680807	·001589825
630	396900	250047000	25-0998008	8-5726189	·001587302
631	398161	251239591	25-1197134	8-5771523	·001584786
632	399424	252435968	25-1396102	8-5816809	·001582278
633	400689	253636137	25-1594913	8-5862247	·001579779
634	401956	254840104	25-1793566	8-5907238	·001577287
635	403225	256047875	25-1992063	8-5952380	·001574803
636	404496	257259456	25-2190404	8-5997476	·001572327
637	405769	258474853	25-2388589	8-6042525	·001569859
638	407044	259694072	25-2586619	8-6087526	·001567398
639	408321	260917119	25-2784493	8-6132480	·001564945
640	409600	262144000	25-2982213	8-6177388	·001562500
641	410881	263374721	25-3179778	8-6222248	·001560062
642	412164	264609288	25-3377189	8-6267063	·001557632
643	413449	265847707	25-3574447	8-6311830	·001555210
644	414736	267089984	25-3771551	8-6356551	·001552795
645	416025	268336125	25-3968502	8-6401226	·001550388
646	417316	269585136	25-4165302	8-6445855	·001547988
647	418609	270840023	25-4361947	8-6490437	·001545595
648	419904	272097792	25-4558441	8-6534974	·001543210
649	421201	273359449	25-4754784	8-6579465	·001540832
650	422500	274625000	25-4950976	8-6623911	·001538462
651	423801	275894451	25-5147013	8-6668310	·001536098
652	425104	277167808	25-5342907	8-6712665	·001533742
653	426409	278445077	25-5538647	8-6756974	·001531394
654	427716	279726264	25-5734237	8-6801237	·001529052
655	429025	281011375	25-5929678	8-6845456	·001526718
656	430336	282300416	25-6124969	8-6889630	·001524390
657	431639	283593393	25-6320112	8-6933759	·001522070
658	432964	284890312	25-6515107	8-6977843	·001519751
659	434281	286191179	25-6709953	8-7021882	·001517451
660	435600	287496000	25-6904652	8-7065877	·001515152
661	436921	288804781	25-7099203	8-7109827	·001512859
662	438244	290117528	25-7293607	8-7153734	·001510574
663	439569	291434247	25-7487864	8-7197596	·001508296
664	440896	292754944	25-7681975	8-7241414	·001506024
665	442225	294079625	25-7875939	8-7285187	·001503759
666	443556	295408296	25-8069758	8-7328918	·001501502
667	444889	296740963	25-8263431	8-7372604	·001499250
668	446224	298077632	25-8456960	8-7416246	·001497006
669	447561	299418309	25-8650343	8-7459846	·001494768
670	448900	300763000	25-8843582	8-7503401	·001492537

No.	Squares.	Cubes.	Square Roots.	Cube Roots.	Reciprocals.
671	450241	302111711	25-9036677	8-7546913	·001490313
672	451584	303464448	25-9229628	8-7590383	·001488095
673	452929	304821217	25-9422435	8-7633809	·001485884
674	454276	306182024	25-9615100	8-7677192	·001483680
675	455625	307546875	25-9807621	8-7720532	·001481481
676	456976	308915776	26-0000000	8-7763830	·001479290
677	458329	310288733	26-0192237	8-7807084	·001477105
678	459684	311665752	26-0384331	8-7850296	·001474926
679	461041	313046839	26-0576284	8-7893466	·001472754
680	462400	314432000	26-0768096	8-7936593	·001470588
681	463761	315821241	26-0959767	8-7979679	·001468429
682	465124	317214568	26-1151297	8-8022721	·001466276
683	466489	318611987	26-1342687	8-8065722	·001464129
684	467856	320013504	26-1533937	8-8108681	·001461988
685	469225	321419125	26-1725047	8-8151598	·001459854
686	470596	322828856	26-1916017	8-8194474	·001457726
687	471969	324242703	26-2106848	8-8237307	·001455604
688	473344	325660672	26-2297541	8-8280099	·001453488
689	474721	327082769	26-2488095	8-8322850	·001451379
690	476100	328509000	26-2678511	8-8365559	·001449275
691	477481	329939371	26-2868789	8-8408227	·001447178
692	478864	331373888	26-3058929	8-8450854	·001445087
693	480249	332812557	26-3248932	8-8493440	·001443001
694	481636	334255384	26-3438797	8-8535985	·001440922
695	483025	335702375	26-3628527	8-8578489	·001438849
696	484416	337153536	26-3818119	8-8620952	·001436782
697	485809	338608873	26-4007576	8-8663375	·001434720
698	487204	340068392	26-4196896	8-8705757	·001432665
699	488601	341532099	26-4386081	8-8748099	·001430615
700	490000	343000000	26-4575131	8-8790400	·001428571
701	491401	344472101	26-4764046	8-8832661	·001426534
702	492804	345948408	26-4952826	8-8874882	·001424501
703	494209	347428927	26-5141472	8-8917063	·001422475
704	495616	348913664	26-5329983	8-8959204	·001420455
705	497025	350402625	26-5518361	8-9001304	·001418440
706	498436	351895816	26-5706605	8-9043366	·001416431
707	499849	353393243	26-5894716	8-9085387	·001414427
708	501264	354894912	26-6082694	8-9127369	·001412429
709	502681	356400829	26-6270539	8-9169311	·001410437
710	504100	357911000	26-6458232	8-9211214	·001408451
711	505521	359425431	26-6645833	8-9253078	·001406470
712	506944	360944128	26-6833281	8-9294902	·001404494
713	508369	362467097	26-7020598	8-9336687	·001402525
714	509796	363994344	26-7207784	8-9378433	·001400560
715	511225	365525875	26-7394839	8-9420140	·001398601
716	512656	367061696	26-7581763	8-9461809	·001396648
717	514089	368601813	26-7768557	8-9503438	·001394700
718	515524	370146232	26-7955220	8-9545029	·001392758
719	516961	371694959	26-8141754	8-9586581	·001390821
720	518400	373248000	26-8328157	8-9628095	·001388889
721	519841	374805361	26-8514432	8-9669570	·001386963
722	521284	376367048	26-8700577	8-9711007	·001385042
723	522729	377933067	26-8886593	8-9752406	·001383126
724	524176	379503424	26-9072481	8-9793766	·001381215
725	525625	381078125	26-9258240	8-9835089	·001379310
726	527076	382657176	26-9443872	8-9876373	·001377410
727	528529	384240583	26-9629375	8-9917620	·001375516
728	529984	385828352	26-9814751	8-9958899	·001373626
729	531441	387420489	27-0000000	9-0000000	·001371742
730	532900	389017000	27-0185122	9-0041134	·001369863
731	534361	390617891	27-0370117	9-0082229	·001367989
732	535824	392223168	27-0554985	9-0123288	·001366120

No.	Squares.	Cubes.	Square Roots.	Cube Roots.	Reciprocals.
733	537289	393832837	27-0739727	9 0164309	·001364256
734	538756	395446904	27-0924344	9 0205293	·001362398
735	540225	397065375	27-1108834	9 0246239	·001360544
736	541696	398688256	27-1293199	9 0287149	·001358696
737	543169	400315553	27-1477149	9 0328021	·001356852
738	544644	401947272	27-1661554	9 0368857	·001355014
739	546121	403583419	27-1845544	9 0409655	·001353180
740	547600	405224000	27 2029140	9 0450419	·001351351
741	549801	406869021	27 2213152	9 0491142	·001349528
742	550564	408518488	27 2396769	9 0531831	·001347709
743	552049	410172407	27 2580263	9 0572482	·001345895
744	553536	411830784	27-2763634	9 0613093	·001344086
745	555025	413493625	27-2946881	9 0653677	·001342282
746	556516	415160936	27-3130006	9 0694220	·001340483
747	558009	416832723	27-3313007	9 0734726	·001338688
748	559504	418508992	27-3495887	9 0775197	·001336898
749	561001	420189749	27-3678644	9 0815631	·001335113
750	562500	421875000	27-3861279	9 0856030	·001333333
751	564001	423564751	27-4043792	9 0896352	·001331558
752	565504	425259008	27-4226184	9 0936719	·001329787
753	567009	426957777	27-4408455	9 0977010	·001328021
754	568516	428661064	27-4590604	9 1017265	·001326260
755	570025	430368875	27 4772633	9 1057485	·001324503
756	571536	432081216	27-4954542	9 1097669	·001322751
757	573049	433798393	27-5136330	9 1137818	·001321004
758	574564	435519512	27-5317998	9 1177931	·001319261
759	576081	437245479	27-5499546	9 1218010	·001317523
760	577600	438976000	27-5680975	9 1258053	·001315789
761	579121	440711081	27-5862284	9 1298061	·001314060
762	580644	442450728	27 6043475	9 1338034	·001312336
763	582169	444194947	27 6224546	9 1377971	·001310616
764	583696	445943744	27 6405499	9 1417874	·001308911
765	585225	447697125	27 6586334	9 1457742	·001307190
766	586756	449455096	27-6767050	9 1497576	·001305483
767	588289	451217663	27-6947648	9 1537375	·001303781
768	589824	452984832	27-7128129	9 1577139	·001302083
769	591361	454756609	27-7308492	9 1616869	·001300390
770	592900	456533000	27-7488739	9 1656565	·001298701
771	594441	458314011	27 7668868	9 1696225	·001297017
772	595984	460099648	27 7848880	9 1735852	·001295337
773	597529	461889917	27 8028775	9 1775445	·001293661
774	599076	463684824	27 8208555	9 1815003	·001291990
775	600625	465484375	27 8388218	9 1854527	·001290323
776	602176	467288576	27 8567766	9 1894018	·001288660
777	603729	469097433	27 8747197	9 1933474	·001287001
778	605284	470910952	27-8926514	9 1972897	·001285347
779	606841	472729139	27-9105715	9 2012286	·001283697
780	608400	474552000	27 9284801	9 2051641	·001282051
781	609961	476379541	27-9463772	9 2090962	·001280410
782	611524	478211768	27-9642629	9 2130250	·001278772
783	613089	480048687	27 9821372	9 2169505	·001277139
784	614656	481890304	28 0000000	9 2208726	·001275510
785	616225	483736625	28 0178515	9 2247914	·001273885
786	617796	485587656	28-0356915	9 2287068	·001272265
787	619369	487443403	28-0535203	9 2326189	·001270648
788	620944	489303872	28-0713377	9 2365277	·001269036
789	622521	491169069	28-0891438	9 2404333	·001267427
790	624100	493039000	28 1069386	9 2443355	·001265823
791	625681	494913671	28-1247222	9 2482344	·001264223
792	627264	496793088	28 1424946	9 2521300	·001262626
793	628849	498677257	28-1602557	9 2560224	·001261034
794	630436	500566184	28 1780056	9 2599114	·001259446

No.	Squares.	Cubes.	Square Roots.	Cube Roots.	Reciprocals.
795	632025	502459875	28 1957444	9 2637973	·001257862
796	633616	504358336	28 2134720	9 2676798	·001256281
797	635209	506261573	28 2311884	9 2715592	·001254705
798	636804	508169592	28 2488938	9 2754352	·001253133
799	638401	510082399	28 2665881	9 2793081	·001251364
800	640000	512000000	28 2842712	9 2831777	·001250000
801	641601	513922401	28 3019434	9 2870444	·001248439
802	643204	515849608	28 3196045	9 2909072	·001246883
803	644809	517781627	28 3372546	9 2947671	·001245330
804	646416	519718464	28 3548938	9 2986239	·001243781
805	648025	521660125	28 3725219	9 3024775	·001242236
806	649636	523606616	28 3901391	9 3063278	·001240695
807	651249	525557943	28 4077454	9 3101750	·001239157
808	652864	527514112	28 4253408	9 3140190	·001237624
809	654481	529475129	28 4429253	9 3178599	·001236094
810	656100	531441000	28 4604989	9 3216975	·001234568
811	657721	533411731	28 4780617	9 3255320	·001233046
812	659344	535387328	28 4956137	9 3293634	·001231527
813	660969	537367797	28 5131549	9 3331916	·001230012
814	662596	539353144	28 5306852	9 3370167	·001228501
815	664225	541343375	28 5482048	9 3408386	·001226994
816	665856	543338496	28 5657137	9 3446575	·001225499
817	667489	545338513	28 5832119	9 3484731	·001223990
818	669124	547343432	28 6006993	9 3522357	·001222494
819	670761	549353259	28 6181760	9 3560952	·001221001
820	672400	551368000	28 6356421	9 3599016	·001219512
821	674041	553387661	28 6530976	9 3637049	·001218027
822	675684	555412248	28 6705424	9 3675051	·001216545
823	677329	557441767	28 6879716	9 3713022	·001215067
824	678976	559476224	28 7054002	9 3750963	·001213592
825	680625	561515625	28 7228132	9 3788873	·001212121
826	682276	563559976	28 7402157	9 3826752	·001210654
827	683929	565609283	28 7576077	9 3864600	·001209190
828	685584	567663552	28 7749891	9 3902419	·001207729
829	687241	56972789	28 7923601	9 3940206	·001206273
830	688900	571787000	28 8097206	9 3977964	·001204819
831	690561	573856191	28 8270706	9 4015691	·001203369
832	692224	575930368	28 8444102	9 4053387	·001201923
833	693889	578009537	28 8617394	9 4091054	·001200480
834	695556	580093704	28 8790592	9 4128690	·001199041
835	697225	582182875	28 8963666	9 4166297	·001197605
836	698896	584277056	28 9136646	9 4203873	·001196172
837	700569	586376253	28 9309523	9 4241420	·001194743
838	702244	588480472	28 9482297	9 4278936	·001193317
839	703921	590589719	28 9654967	9 4316423	·001191895
840	705600	592704000	28 9827535	9 4353800	·001190476
841	707281	594823321	29 0000000	9 4391307	·001189061
842	708964	596947688	29 0172363	9 4428704	·001187648
843	710649	599077107	29 0344623	9 4466072	·001186240
844	712336	601211584	29 0516781	9 4503410	·001184834
845	714025	603351125	29 0688837	9 4540719	·001183432
846	715716	605495736	29 0860791	9 4577999	·001182033
847	717409	607645423	29 1032644	9 4615249	·001180638
848	719104	609800192	29 1204396	9 4652470	·001179245
849	720801	611960049	29 1376046	9 4689661	·001177856
850	722500	614125000	29 1547595	9 4726824	·001176471
851	724201	616295051	29 1719043	9 4763957	·001175088
852	725904	618470208	29 1890390	9 4801061	·001173709
853	727609	620650477	29 2061637	9 4838136	·001172333
854	729316	622835864	29 2232784	9 4875182	·001170960
855	731025	625026375	29 2403830	9 4912200	·001169591
856	732736	627222016	29 2574777	9 4949188	·001168224

No.	Squares.	Cubes.	Square Roots.	Cube Roots.	Reciprocals.
857	734449	629422793	29-2745623	9-4986147	·001166261
858	736164	631628712	29-2916370	9-5023078	·001165501
859	737881	633839779	29-3087018	9-5059980	·001164144
860	739600	636056000	29-3257566	9-5096854	·001162791
861	741321	638277381	29-3428015	9-5133699	·001161440
862	743044	640503928	29-3598365	9-5170515	·001160093
863	744769	642735647	29-3768616	9-5207303	·001158749
864	746496	644972544	29-3938769	9-5244063	·001157407
865	748225	647214625	29-5108823	9-5280794	·001156069
866	749956	649461896	29-4278779	9-5317497	·001154734
867	751689	651714363	29-4448637	9-5354172	·001153403
868	753424	653972032	29-4618397	9-5390818	·001152074
869	755161	656234909	29-4788059	9-5427437	·001150748
870	756900	658503000	29-4957624	9-5464027	·001149425
871	758641	660776311	29-5127091	9-5500589	·001148106
872	760384	663054848	29-5296461	9-5537123	·001146789
873	762129	665338617	29-5465734	9-5573630	·001145475
874	763876	667627624	29-5634910	9-5610108	·001144165
875	765625	669921875	29-5803989	9-5646559	·001142857
876	767376	672221376	29-5972972	9-5682782	·001141553
877	769129	674526133	29-6141858	9-5719377	·001140251
878	770884	676836152	29-6310648	9-5755745	·001138952
879	772641	679151439	29-6479342	9-5792085	·001137656
880	774400	681472000	29-6647939	9-5828397	·001136364
881	776161	683797841	29-6816442	9-5864682	·001135074
882	777924	686128968	29-6984848	9-5900937	·001133787
883	779689	688465387	29-7153159	9-5937169	·001132503
884	781456	690807104	29-7321375	9-5973373	·001131222
885	783225	693154125	29-7489496	9-6009548	·001129944
886	784996	695506456	29-7657521	9-6045696	·001128668
887	786769	697864103	29-7825452	9-6081817	·001127396
888	788544	700227072	29-7993289	9-6117911	·001126126
889	790321	702595369	29-8161030	9-6153977	·001124859
890	792100	704969000	29-8328678	9-6190017	·001123596
891	793881	707347971	29-8496231	9-6226030	·001122334
892	795664	707932288	29-8663690	9-6262016	·001121076
893	797449	712121957	29-8831056	9-6297975	·001119821
894	799236	714516984	29-8998328	9-6333907	·001118568
895	801025	716917375	29-9165506	9-6369812	·001117318
896	802816	719323136	29-9332591	9-6405690	·001116071
897	804609	721734273	29-9499583	9-6441542	·001114827
898	806404	724150792	29-9666481	9-6477367	·001113586
899	808201	726572699	29-9833287	9-6513166	·001112347
900	810000	729000000	30-0000000	9-6548938	·001111111
901	811801	731432701	30-0166621	9-6584684	·001109878
902	813604	733870808	30-0333148	9-6620403	·001108647
903	815409	736314327	30-0499584	9-6656096	·001107420
904	817216	738763264	30-0665928	9-6691762	·001106195
905	819025	741217625	30-0832179	9-6727403	·001104972
906	820836	743677416	30-0998339	9-6763017	·001103753
907	822649	746142643	30-1164407	9-6798604	·001102536
908	824464	748613312	30-1330383	9-6834166	·001101322
909	826281	751089429	30-1496269	9-6869701	·001100110
910	828100	753571000	30-1662063	9-6905211	·001098901
911	829921	756058031	30-1827765	9-6940694	·001097695
912	831744	758550825	30-1993377	9-6976151	·001096491
913	833569	761048497	30-2158899	9-7011583	·001095290
914	835396	763551944	30-2324329	9-7046989	·001094092
915	837225	766060875	30-2489669	9-7082369	·001092896
916	839056	768575296	30-2654919	9-7117723	·001091703
917	840889	771095213	30-2820079	9-7153051	·001090513
918	842724	773620632	30-2985148	9-7188354	·001089325

No.	Squares.	Cubes.	Square Roots.	Cube Roots.	Reciprocals.
919	844561	776151559	30.3150128	9.7223631	.001088139
920	846400	778688000	30.3315018	9.7258883	.001086957
921	848241	781229961	30.3479818	9.7294109	.001085776
922	850084	783777448	30.3644529	9.7329309	.001084599
923	851929	786330467	30.3809151	9.7364484	.001083423
924	853776	788889024	30.3973683	9.7399634	.001082251
925	855625	791453125	30.4138127	9.7434758	.001081081
926	857476	794022776	30.4302481	9.7469857	.001079914
927	859329	796597983	30.4466747	9.7504930	.001078749
928	861184	799178752	30.4630924	9.7539979	.001077586
929	863041	801765089	30.4795013	9.7575002	.001076426
930	864900	804357000	30.4959014	9.7610001	.001075269
931	866761	806954491	30.5122926	9.7644974	.001074114
932	868624	809557568	30.5286750	9.7679932	.001072961
933	870489	812166237	30.5450487	9.7714845	.001071811
934	872356	814780504	30.5614136	9.7749743	.001070664
935	874225	817400375	30.5777697	9.7784616	.001069519
936	876096	820025856	30.5941171	9.7829466	.001068376
937	877969	822656953	30.6104557	9.7854288	.001067236
938	879844	825293672	30.6267857	9.7889087	.001066098
939	881721	827936019	30.6431069	9.7923861	.001064963
940	883600	830584000	30.6594194	9.7958611	.001063830
941	885481	833237621	30.6757233	9.7993336	.001062699
942	887364	835896888	30.6920185	9.8028036	.001061571
943	889249	838561807	30.7083051	9.8062711	.001060445
944	891136	841232384	30.7245830	9.8097362	.001059322
945	893025	843908625	30.7408523	9.8131989	.001058201
946	894916	846590536	30.7571130	9.8166591	.001057082
947	896808	849278123	30.7733651	9.8201169	.001055966
948	898704	851971392	30.7896086	9.8235723	.001054852
949	900601	854670349	30.8058436	9.8270252	.001053741
950	902500	857375000	30.8220700	9.8304757	.001052632
951	904401	860085351	30.8382879	9.8339238	.001051525
952	906304	862801408	30.8544972	9.8373695	.001050420
953	908209	865523177	30.8706981	9.8408127	.001049318
954	910116	868250664	30.8868904	9.8442536	.001048218
955	912025	870983875	30.9030743	9.8476920	.001047120
956	913936	873722816	30.9192477	9.8511280	.001046025
957	915849	876467493	30.9354166	9.8545617	.001044932
958	917764	879217912	30.9515751	9.8579929	.001043841
959	919681	881974079	30.9677251	9.8614218	.001042753
960	921600	884736000	30.9838668	9.8648483	.001041667
961	923521	887503681	31.0000000	9.8682724	.001040583
962	925444	890277128	31.0161248	9.8716941	.001039501
963	927369	893056347	31.0322413	9.8751135	.001038422
964	929296	895841344	31.0483494	9.8785305	.001037344
965	931225	898632125	31.0644491	9.8819451	.001036269
966	933156	901428696	31.0805405	9.8853574	.001035197
967	935089	904231063	31.0966236	9.8887673	.001034126
968	937024	907039232	31.1126984	9.8921749	.001033058
969	938961	909853209	31.1287648	9.8955801	.001031992
970	940900	912673000	31.1448230	9.8989830	.001030928
971	942841	915498611	31.1608729	9.9023835	.001029866
972	944784	918330048	31.1769145	9.9057817	.001028807
973	946729	921167317	31.1929479	9.9091776	.001027749
974	948676	924010424	31.2089731	9.9125712	.001026694
975	950625	926859375	31.2249900	9.9159624	.001025641
976	952576	929714176	31.2409987	9.9193513	.001024590
977	954529	932574833	31.2569992	9.9227379	.001023541
978	956484	935441352	31.2729915	9.9261222	.001022495
979	958441	938313739	31.2889757	9.9295042	.001021450
980	960400	941192000	31.3049517	9.9328839	.001020408

No.	Squares.	Cubes.	Square Roots.	Cube Roots.	Reciprocals.
981	962361	944076141	31.3209195	9.9362613	.001019168
982	964324	946966168	31.3368792	9.9396363	.001018330
983	966289	949862087	31.3528308	9.9430092	.001017294
984	968256	952763904	31.3687743	9.9463797	.001016260
985	970225	955671625	31.3847097	9.9497479	.001015228
986	972196	958585256	31.4006369	9.9531138	.001014199
987	974169	961504803	31.4165561	9.9564775	.001013171
988	976144	964430272	31.4324673	9.9598389	.001012146
989	978121	967361669	31.4483704	9.9631981	.001011122
990	980100	970299000	31.4642654	9.9665549	.001010101
991	982081	973242271	31.4801525	9.9699055	.001009082
992	984064	976191488	31.4960315	9.9732619	.001008065
993	986049	979146657	31.5119025	9.9766120	.001007049
994	988036	982107784	31.5277655	9.9799599	.001006036
995	990025	985074875	31.5436206	9.9833055	.001005025
996	992016	988047936	31.5594677	9.9866488	.001004016
997	994009	991026973	31.5753068	9.9899900	.001003009
998	996004	994011992	31.5911380	9.9933289	.001002004
999	998001	997002999	31.6069613	9.9966656	.001001001
1000	1000000	1000000000	31.6227766	10.0000000	.001000000
1001	1000201	1003003001	31.6385840	10.0033222	.0009990010
1002	1004004	1006012008	31.6543866	10.0066622	.0009980040
1003	1006009	1009027027	31.6701752	10.0099899	.0009970090
1004	1008016	1012048064	31.6859590	10.0133155	.0009960159
1005	1010025	1015075125	31.7017349	10.0166389	.0009950249
1006	1012036	1018108216	31.7175030	10.0199601	.0009940358
1007	1014049	1021147343	31.7332633	10.0232791	.0009930487
1008	1016064	1024192512	31.7490157	10.0265958	.0009920635
1009	1018081	1027243729	31.7647603	10.0299104	.0009910803
1010	1020100	1030301000	31.7804972	10.0332228	.0009900990
1011	1020121	1033364331	31.7962262	10.0365330	.0009891197
1012	1024144	1036433728	31.8119474	10.0398410	.0009881423
1013	1026169	1039509197	31.8276609	10.0431469	.0009871668
1014	1028196	1042590744	31.8433666	10.0464506	.0009861933
1015	1030225	1045678375	31.8590646	10.0497521	.0009852217
1016	1032256	1048772096	31.8747549	10.0530514	.0009842520
1017	1034289	1051871913	31.8904374	10.0563485	.0009832842
1018	1036324	1054977832	31.9061123	10.0596435	.0009823183
1019	1038361	1058089859	31.9217794	10.0629364	.0009813543
1020	1040400	1061208000	31.9374388	10.0662271	.0009803922
1021	1042441	1064332261	31.9530906	10.0695156	.0009794319
1022	1044484	1067462648	31.9687347	10.0728020	.0009784736
1023	1046529	1070599167	31.9843712	10.0760863	.0009775171
1024	1048576	1073741824	32.0000000	10.0793684	.0009765625
1025	1050625	1076890625	32.0156212	10.0826484	.0009756098
1026	1052676	1080045576	32.0312348	10.0859262	.0009746589
1027	1054729	1083206683	32.0468407	10.0892019	.0009737098
1028	1056784	1086373952	32.0624391	10.0924755	.0009727626
1029	1058841	1089547389	32.0780298	10.0957469	.0009718173
1030	1060900	1092727000	32.0936131	10.0990163	.0009708738
1031	1062961	1095912791	32.1091887	10.1022835	.0009699321
1032	1065024	1099104768	32.1247568	10.1055487	.0009689922
1033	1067089	1102302937	32.1403173	10.1088117	.0009680542
1034	1069156	1105507304	32.1558704	10.1120726	.0009671180
1035	1071225	1108717875	32.1714159	10.1153314	.0009661836
1036	1073296	1111934656	32.1869539	10.1185882	.0009652510
1037	1075369	1115157653	32.2024844	10.1218428	.0009643202
1038	1077444	1118386872	32.2180074	10.1250953	.0009633911
1039	1079521	1121622319	32.2335229	10.1283457	.0009624629
1040	1081600	1124864000	32.2490310	10.1315941	.0009615355
1041	1083681	1128111921	32.2645316	10.1348493	.0009606146
1042	1085764	1131366088	32.2800248	10.1380845	.0009596920

TABLE

OF

CIRCUMFERENCES AND AREAS OF CIRCLES,

In Feet and 10ths of a foot, or in Inches and 10ths of an inch.

Diam.	Circum.	Area.	Diam.	Circum.	Area.	Diam.	Circum.	Area.
0	000	000	5 0	15.708	19.635	10 0	31.416	78.540
1	314	007	1	16.022	20.428	1	31.730	80.118
2	628	031	2	16.336	21.237	2	32.044	81.713
3	942	070	3	16.650	22.061	3	32.358	83.323
4	1.256	125	4	16.964	22.902	4	32.672	84.948
5	1.571	196	5	17.278	23.758	5	32.986	86.590
6	1.884	282	6	17.592	24.630	6	33.300	88.248
7	2.199	384	7	17.906	25.517	7	33.614	89.920
8	2.513	502	8	18.221	26.420	8	33.929	91.609
9	2.827	636	9	18.535	27.339	9	34.243	93.313
1 0	3.141	785	6 0	18.849	28.274	11 0	34.557	95.033
1	3.456	950	1	19.163	29.224	1	34.871	96.769
2	3.769	1.130	2	19.477	30.190	2	35.185	98.520
3	4.084	1.327	3	19.792	31.172	3	35.499	100.287
4	4.399	1.539	4	20.106	32.169	4	35.814	102.070
5	4.713	1.767	5	20.420	33.183	5	36.128	103.860
6	5.027	2.010	6	20.734	34.212	6	36.442	105.683
7	5.341	2.269	7	21.048	35.256	7	36.756	107.513
8	5.655	2.544	8	21.362	36.316	8	37.070	109.359
9	5.969	2.835	9	21.677	37.412	9	37.384	111.220
2 0	6.283	3.141	7 0	21.991	38.484	12 0	37.699	113.097
1	6.596	3.463	1	22.305	39.592	1	38.013	114.990
2	6.910	3.801	2	22.619	40.715	2	38.327	116.898
3	7.224	4.154	3	22.933	41.853	3	38.641	118.823
4	7.538	4.523	4	23.247	43.008	4	38.955	120.763
5	7.853	4.908	5	23.562	44.178	5	39.269	122.718
6	8.167	5.309	6	23.876	45.364	6	39.583	124.690
7	8.481	5.725	7	24.190	46.566	7	39.898	126.677
8	8.795	6.157	8	24.504	47.783	8	40.212	128.679
9	9.109	6.605	9	24.818	49.016	9	40.526	130.698
3 0	9.424	7.068	8 0	25.132	50.265	13 0	40.840	132.732
1	9.737	7.547	1	25.446	51.530	1	41.154	134.782
2	10.051	8.042	2	25.760	52.810	2	41.468	136.848
3	10.366	8.553	3	26.074	54.106	3	41.782	138.929
4	10.680	9.079	4	26.388	55.417	4	42.097	141.026
5	10.994	9.621	5	26.702	56.745	5	42.411	143.139
6	11.308	10.178	6	27.016	58.082	6	42.725	145.267
7	11.622	10.752	7	27.331	59.446	7	43.039	147.411
8	11.936	11.341	8	27.645	60.821	8	43.353	149.571
9	12.251	11.945	9	27.959	62.212	9	43.667	151.747
4 0	12.566	12.566	9 0	28.274	63.617	14 0	43.982	153.938
1	12.880	13.202	1	28.587	65.038	1	44.296	156.145
2	13.194	13.854	2	28.901	66.476	2	44.610	158.368
3	13.508	14.522	3	29.215	67.929	3	44.924	160.606
4	13.822	15.205	4	29.530	69.397	4	45.238	162.860
5	14.137	15.904	5	29.844	70.882	5	45.552	165.130
6	14.451	16.619	6	30.158	72.387	6	45.866	167.415
7	14.765	17.349	7	30.472	73.898	7	46.180	169.717
8	15.079	18.095	8	30.786	75.429	8	46.495	172.034
9	15.393	18.857	9	31.100	76.977	9	46.809	174.366

Diam.	Circum.	Area.	Diam.	Circum.	Area.	Diam.	Circum.	Area.
15 ·0	47·124	176·715	21 ·0	65·793	346·361	27 ·0	84·823	572·556
·1	47·438	179·079	·1	66·287	349·667	·1	85·137	576·805
·2	47·752	181·358	·2	66·601	352·990	·2	85·451	581·070
·3	48·066	183·854	·3	66·915	356·328	·3	85·765	585·350
·4	48·380	186·265	·4	67·229	359·681	·4	86·079	589·646
·5	48·694	188·692	·5	67·543	363·051	·5	86·393	593·958
·6	49·008	191·134	·6	67·857	366·435	·6	86·707	598·286
·7	49·323	193·593	·7	68·171	369·837	·7	87·021	602·729
·8	49·637	196·067	·8	68·486	373·253	·8	87·335	606·988
·9	49·951	198·556	·9	68·800	376·685	·9	87·649	611·363
16 ·0	50·265	201·062	22 ·0	69·115	380·133	28 ·0	87·964	615·753
·1	50·579	203·583	·1	69·429	383·597	·1	88·277	620·159
·2	50·893	206·120	·2	69·743	387·076	·2	88·591	624·581
·3	51·207	208·672	·3	70·057	390·571	·3	88·905	629·019
·4	51·522	211·241	·4	70·371	394·082	·4	89·220	633·472
·5	51·836	213·825	·5	70·686	397·608	·5	89·534	637·941
·6	52·150	216·424	·6	71·000	401·150	·6	89·848	642·425
·7	52·464	219·040	·7	71·314	404·708	·7	90·162	646·926
·8	52·778	221·671	·8	71·629	408·282	·8	90·476	651·442
·9	53·092	224·318	·9	71·943	411·871	·9	90·790	655·973
17 ·0	53·407	226·980	23 ·0	72·256	415·476	29 ·0	91·106	660·521
·1	53·721	229·658	·1	72·570	419·097	·1	91·420	665·084
·2	54·035	232·352	·2	72·885	422·733	·2	91·734	669·663
·3	54·349	235·062	·3	73·199	426·385	·3	92·048	674·258
·4	54·663	237·787	·4	73·513	430·053	·4	92·362	678·867
·5	54·977	240·523	·5	73·827	433·737	·5	92·676	683·494
·6	55·291	243·285	·6	74·141	437·436	·6	92·990	688·136
·7	55·606	246·057	·7	74·455	441·151	·7	93·305	692·793
·8	55·920	248·846	·8	74·770	444·881	·8	93·619	697·466
·9	56·234	251·650	·9	75·084	448·628	·9	93·933	702·155
18 ·0	56·548	254·469	24 ·0	75·398	452·390	30 ·0	94·248	706·860
·1	56·862	257·324	·1	75·712	456·168	·1	94·561	711·580
·2	57·176	260·155	·2	76·026	459·961	·2	94·875	716·316
·3	57·490	263·022	·3	76·340	463·770	·3	95·189	721·067
·4	57·805	265·905	·4	76·655	467·595	·4	95·504	725·835
·5	58·119	268·803	·5	76·969	471·436	·5	95·818	730·618
·6	58·433	271·716	·6	77·284	475·292	·6	96·132	735·417
·7	58·747	274·646	·7	77·598	479·164	·7	96·446	740·231
·8	59·061	277·591	·8	77·912	483·052	·8	96·760	745·061
·9	59·375	280·552	·9	78·226	486·955	·9	97·074	749·907
19 ·0	59·690	283·529	25 ·0	78·540	490·875	31 ·0	97·389	754·769
·1	60·004	286·521	·1	78·855	494·809	·1	97·703	759·646
·2	60·318	289·529	·2	79·169	498·760	·2	98·017	764·539
·3	60·632	292·553	·3	79·483	502·726	·3	98·331	769·448
·4	60·946	295·593	·4	79·797	506·708	·4	98·645	774·372
·5	61·260	298·693	·5	80·111	510·706	·5	98·959	779·313
·6	61·574	301·719	·6	80·425	514·719	·6	99·273	784·269
·7	61·888	304·805	·7	80·739	518·748	·7	99·588	789·240
·8	62·203	307·908	·8	81·053	522·793	·8	99·902	794·227
·9	62·517	311·026	·9	81·367	526·854	·9	100·216	799·230
20 ·0	62·832	314·160	26 ·0	81·681	530·930	32 ·0	100·531	804·249
·1	63·145	317·309	·1	81·995	535·022	·1	100·844	809·284
·2	63·459	320·474	·2	82·309	539·129	·2	101·158	814·334
·3	63·773	323·655	·3	82·623	543·253	·3	101·472	819·399
·4	64·088	326·852	·4	82·937	547·392	·4	101·787	824·481
·5	64·402	330·064	·5	83·257	551·547	·5	102·101	829·578
·6	64·716	333·292	·6	83·556	555·717	·6	102·415	834·691
·7	65·030	336·536	·7	83·880	559·903	·7	102·729	839·820
·8	65·344	339·795	·8	84·294	564·105	·8	103·043	844·964
·9	65·658	343·070	·9	84·508	568·323	·9	103·357	850·124

TABLE

EXHIBITING THE WEIGHT

Of a Lineal Foot of Square Rolled Iron, in lbs., from $\frac{1}{4}$ to 12 Square Inches.

Size in inches.	Weight in pounds.	Size in inches.	Weight in pounds.	Size in inches.	Weight in pounds.	Size in inches.	Weight in pounds.
$\frac{1}{4}$	·211	$2\frac{1}{4}$	21·120	$4\frac{3}{4}$	76·264	8	216·336
$\frac{1}{2}$	·475	$2\frac{1}{2}$	23·292	$5\frac{1}{8}$	80·333	$8\frac{1}{4}$	230·068
$\frac{3}{4}$	·845	$2\frac{3}{4}$	25·560	$5\frac{1}{4}$	84·480	$8\frac{1}{2}$	244·220
1	1·320	$3\frac{1}{8}$	27·939	$5\frac{3}{8}$	88·784	$8\frac{3}{4}$	258·800
$1\frac{1}{4}$	1·901	$3\frac{1}{4}$	30·416	$5\frac{1}{2}$	93·168	9	273·792
$1\frac{1}{2}$	2·588	$3\frac{3}{8}$	33·010	$5\frac{3}{4}$	97·657	$9\frac{1}{4}$	289·220
$1\frac{3}{4}$	3·380	$3\frac{1}{2}$	35·704	$6\frac{1}{8}$	102·240	$9\frac{1}{2}$	305·056
2	4·278	$3\frac{3}{4}$	38·503	$6\frac{1}{4}$	106·953	$9\frac{3}{4}$	321·332
$2\frac{1}{4}$	5·280	$4\frac{1}{8}$	41·408	$6\frac{1}{2}$	111·756	10	337·920
$2\frac{1}{2}$	6·390	$4\frac{1}{4}$	44·418	$6\frac{3}{8}$	116·671	$10\frac{1}{4}$	355·136
$2\frac{3}{4}$	7·604	$4\frac{1}{2}$	47·534	$6\frac{1}{2}$	121·664	$10\frac{1}{2}$	372·672
3	8·926	$4\frac{3}{4}$	50·756	$6\frac{3}{4}$	132·040	$10\frac{3}{4}$	390·628
$3\frac{1}{4}$	10·352	$5\frac{1}{8}$	54·084	$6\frac{7}{8}$	142·816	11	408·960
$3\frac{1}{2}$	11·883	$5\frac{1}{4}$	57·517	$7\frac{1}{8}$	154·012	$11\frac{1}{4}$	427·812
$3\frac{3}{4}$	13·520	$5\frac{3}{8}$	61·055	$7\frac{1}{4}$	165·632	$11\frac{1}{2}$	447·024
4	15·263	$5\frac{1}{2}$	64·700	$7\frac{3}{8}$	177·672	$11\frac{3}{4}$	466·684
$4\frac{1}{4}$	17·112	$6\frac{1}{8}$	68·448	$7\frac{1}{2}$	190·136	12	486·656
$4\frac{1}{2}$	19·066	$6\frac{1}{4}$	72·305	$7\frac{3}{4}$	203·024		

TABLE

EXHIBITING THE WEIGHT

Of a Lineal Foot of Round Rolled Iron, from $\frac{1}{4}$ to 12 Inches Diameter.

Diam. in inches.	Weight in pounds.	Diam. in inches.	Weight in pounds.	Diam. in inches.	Weight in pounds.	Diam. in inches.	Weight in pounds.
$\frac{1}{4}$	·165	$2\frac{1}{4}$	16·688	$4\frac{3}{4}$	59·900	8	169·856
$\frac{1}{2}$	·373	$2\frac{1}{2}$	18·293	$5\frac{1}{8}$	63·094	$8\frac{1}{4}$	180·696
$\frac{3}{4}$	·663	$2\frac{3}{4}$	20·076	$5\frac{1}{4}$	66·752	$8\frac{1}{2}$	191·808
1	1·043	$3\frac{1}{8}$	21·944	$5\frac{3}{8}$	69·731	$8\frac{3}{4}$	203·260
$1\frac{1}{4}$	1·493	$3\frac{1}{4}$	23·888	$5\frac{1}{2}$	73·172	9	215·040
$1\frac{1}{2}$	2·032	$3\frac{3}{8}$	25·926	$5\frac{3}{4}$	76·700	$9\frac{1}{4}$	227·152
$1\frac{3}{4}$	2·654	$3\frac{1}{2}$	28·040	$6\frac{1}{8}$	80·304	$9\frac{1}{2}$	239·600
2	3·360	$4\frac{1}{8}$	30·240	$6\frac{1}{4}$	84·001	$9\frac{3}{4}$	252·376
$2\frac{1}{4}$	4·172	$4\frac{1}{4}$	32·512	$6\frac{1}{2}$	87·776	10	266·288
$2\frac{1}{2}$	5·019	$4\frac{3}{4}$	34·886	$6\frac{3}{8}$	91·634	$10\frac{1}{4}$	278·924
$2\frac{3}{4}$	5·972	$5\frac{1}{8}$	37·332	$6\frac{1}{2}$	95·552	$10\frac{1}{2}$	292·688
3	7·010	$5\frac{1}{4}$	39·864	$6\frac{3}{4}$	103·704	$10\frac{3}{4}$	306·800
$3\frac{1}{4}$	8·128	$5\frac{3}{8}$	42·464	$6\frac{7}{8}$	112·160	11	321·216
$3\frac{1}{2}$	9·333	$5\frac{1}{2}$	45·174	$7\frac{1}{8}$	120·960	$11\frac{1}{4}$	336·004
$3\frac{3}{4}$	10·616	$6\frac{1}{8}$	47·952	$7\frac{1}{4}$	130·048	$11\frac{1}{2}$	351·104
4	11·988	$6\frac{1}{4}$	50·815	$7\frac{3}{8}$	139·544	$11\frac{3}{4}$	366·536
$4\frac{1}{4}$	13·440	$6\frac{1}{2}$	53·760	$7\frac{1}{2}$	149·328	12	382·208
$4\frac{1}{2}$	14·975	$6\frac{3}{4}$	56·788	$7\frac{3}{4}$	159·456		

The weight of bar iron being 1;

The weight of cast iron	=	·95
“ “ steel	=	1·02
“ “ copper	=	1·16
“ “ brass	=	1·09
“ “ lead.	=	1·48

TABLE,

EXHIBITING THE WEIGHT

Of a Lineal Foot of Flat Bar Iron, in lbs., from $\frac{1}{2}$ to $5\frac{1}{2}$ inches in breadth, and $\frac{1}{8}$ to 5 inches in thickness.

Breadth in inches.	Thick's in inches.	Weight in pounds.	Breadth in inches.	Thick's in inches.	Weight in pounds.	Breadth in inches.	Thick's in inches.	Weight in pounds.
$\frac{1}{2}$	$\frac{1}{8}$	0.210	$1\frac{3}{8}$	$1\frac{1}{8}$	5.227	$1\frac{7}{8}$	$1\frac{5}{8}$	10.297
	$\frac{1}{4}$	0.422		$1\frac{1}{4}$	5.808		$1\frac{1}{2}$	11.089
$\frac{3}{8}$	$\frac{1}{4}$	0.634	$1\frac{1}{2}$	$1\frac{1}{4}$	0.633	2	$1\frac{1}{4}$	0.845
	$\frac{3}{8}$	0.263		$1\frac{3}{8}$	1.266		$1\frac{3}{8}$	1.669
	$\frac{1}{2}$	0.528		$1\frac{1}{2}$	1.900		$1\frac{1}{2}$	2.534
	$\frac{5}{8}$	0.792		$1\frac{3}{4}$	2.505		$1\frac{3}{4}$	3.379
$\frac{1}{2}$	$\frac{1}{2}$	1.056		$1\frac{7}{8}$	3.168		$1\frac{7}{8}$	4.224
	$\frac{3}{4}$	0.313		1	3.802		1	5.069
	$\frac{3}{4}$	0.633		$1\frac{1}{8}$	4.435		$1\frac{1}{8}$	5.914
	$\frac{7}{8}$	0.950		$1\frac{1}{4}$	5.069		$1\frac{1}{4}$	6.758
	$\frac{7}{8}$	1.265		$1\frac{1}{2}$	5.703		$1\frac{1}{2}$	7.604
	$\frac{7}{8}$	1.584		$1\frac{3}{4}$	6.337		$1\frac{3}{4}$	8.448
	$\frac{7}{8}$	0.367		1	6.970		$1\frac{3}{8}$	9.294
	$\frac{7}{8}$	0.738	$1\frac{3}{8}$	$1\frac{1}{8}$	0.686		$1\frac{3}{8}$	10.138
	$\frac{7}{8}$	1.108		$1\frac{1}{4}$	1.372		$1\frac{3}{8}$	10.983
	$\frac{7}{8}$	1.477		$1\frac{1}{2}$	2.059		$1\frac{3}{4}$	11.828
	$\frac{7}{8}$	1.846		$1\frac{3}{4}$	2.746		1	12.673
	$\frac{7}{8}$	2.217		$1\frac{7}{8}$	3.432	$2\frac{1}{8}$	$1\frac{1}{8}$	0.898
1	$\frac{7}{8}$	0.422		1	4.119		$1\frac{1}{4}$	1.795
	$\frac{7}{8}$	0.835		$1\frac{1}{8}$	4.805		$1\frac{1}{4}$	2.693
	$\frac{7}{8}$	1.267		$1\frac{1}{4}$	5.492		$1\frac{1}{4}$	3.561
	$\frac{7}{8}$	1.690		$1\frac{1}{2}$	6.178		$1\frac{1}{4}$	4.488
	$\frac{7}{8}$	2.112		$1\frac{3}{4}$	6.864		$1\frac{1}{4}$	5.386
	$\frac{7}{8}$	2.534		1	7.551		$1\frac{1}{2}$	6.283
	$\frac{7}{8}$	2.956		$1\frac{1}{8}$	8.237		1	7.181
$1\frac{1}{8}$	$\frac{7}{8}$	0.475	$1\frac{1}{4}$	$1\frac{1}{8}$	0.739		$1\frac{1}{8}$	8.079
	$\frac{7}{8}$	0.940		$1\frac{1}{4}$	1.459		$1\frac{1}{8}$	8.977
	$\frac{7}{8}$	1.425		$1\frac{1}{2}$	2.218		$1\frac{1}{8}$	9.874
	$\frac{7}{8}$	1.901		$1\frac{3}{4}$	2.937		$1\frac{1}{8}$	10.772
	$\frac{7}{8}$	2.375		1	3.696		$1\frac{1}{2}$	11.670
	$\frac{7}{8}$	2.850		$1\frac{1}{8}$	4.435		$1\frac{1}{2}$	12.567
	$\frac{7}{8}$	3.326		$1\frac{1}{4}$	5.178		$1\frac{1}{2}$	13.465
	$\frac{7}{8}$	3.802		1	5.914		2	14.332
$1\frac{1}{4}$	1	0.528		$1\frac{1}{8}$	6.653	$2\frac{1}{4}$	$1\frac{1}{8}$	0.950
	1	1.056		$1\frac{1}{4}$	7.393		$1\frac{1}{4}$	1.900
	1	1.584		$1\frac{1}{2}$	8.132		$1\frac{1}{4}$	2.851
	1	2.112		$1\frac{3}{4}$	8.871		$1\frac{1}{4}$	3.802
	1	2.640		1	9.610		$1\frac{1}{2}$	4.752
	1	3.168		$1\frac{1}{8}$	0.792		$1\frac{1}{2}$	5.703
	1	3.696	$1\frac{1}{8}$	$1\frac{1}{4}$	1.584		$1\frac{1}{2}$	6.653
	1	4.224		$1\frac{1}{2}$	2.376		1	7.504
	$1\frac{1}{8}$	4.752		$1\frac{3}{4}$	3.168		$1\frac{1}{8}$	8.554
$1\frac{1}{8}$	$1\frac{1}{8}$	0.580		1	3.960		$1\frac{1}{8}$	9.505
	$1\frac{1}{8}$	1.161		$1\frac{1}{4}$	4.752		$1\frac{1}{8}$	10.455
	$1\frac{1}{8}$	1.742		$1\frac{1}{2}$	5.544		$1\frac{1}{8}$	11.406
	$1\frac{1}{8}$	2.305		1	6.336		$1\frac{1}{2}$	12.356
	$1\frac{1}{8}$	2.904		$1\frac{1}{8}$	7.129		$1\frac{1}{2}$	13.307
	$1\frac{1}{8}$	3.484		$1\frac{1}{4}$	7.921		$1\frac{1}{2}$	14.257
	$1\frac{1}{8}$	4.065		$1\frac{1}{2}$	8.713		2	15.108
1	$1\frac{1}{8}$	4.646		$1\frac{3}{4}$	9.505		$2\frac{1}{8}$	16.158

Breadth in inches.	Thick's in inches.	Weight in pounds.	Breadth in inches.	Thick's in inches.	Weight in pounds.	Breadth in inches.	Thick's in inches.	Weight in pounds.
2 $\frac{3}{8}$	1 $\frac{1}{8}$	1-003	2 $\frac{3}{4}$	3 $\frac{3}{8}$	6-970	3 $\frac{1}{4}$	3 $\frac{1}{8}$	8-237
	1 $\frac{1}{4}$	2-006		3 $\frac{1}{2}$	8-132		3 $\frac{1}{4}$	9-610
	1 $\frac{3}{8}$	3-009		1	9-294		1	10-983
	1 $\frac{1}{2}$	4-013		1 $\frac{1}{8}$	10-455		1 $\frac{1}{8}$	12-356
	1 $\frac{5}{8}$	5-016		1 $\frac{1}{4}$	11-617		1 $\frac{1}{4}$	13-730
	1 $\frac{3}{4}$	6-019		1 $\frac{3}{8}$	12-779		1 $\frac{3}{8}$	15-102
	1 $\frac{7}{8}$	7-022		1 $\frac{1}{2}$	13-940		1 $\frac{1}{2}$	16-475
	1	8-025		1 $\frac{3}{4}$	15-102		1 $\frac{3}{4}$	17-848
	1 $\frac{1}{8}$	9-028		1 $\frac{7}{8}$	16-264		1 $\frac{7}{8}$	19-221
	1 $\frac{1}{4}$	10-032		1 $\frac{1}{2}$	17-425		1 $\frac{1}{2}$	20-594
	1 $\frac{3}{8}$	11-035		2	18-587		2	21-967
	1 $\frac{1}{2}$	12-038		2 $\frac{1}{8}$	19-749		2 $\frac{1}{8}$	24-712
	1 $\frac{5}{8}$	13-042		2 $\frac{1}{4}$	20-910		2 $\frac{1}{4}$	27-458
	1 $\frac{3}{4}$	14-045		2 $\frac{3}{8}$	22-072		2 $\frac{3}{8}$	30-204
	1 $\frac{7}{8}$	15-048		2 $\frac{1}{2}$	23-234		3	32-950
	2	16-051		2 $\frac{3}{4}$	24-395	3 $\frac{1}{2}$	3 $\frac{1}{8}$	1-479
	2 $\frac{1}{8}$	17-054	2 $\frac{7}{8}$	1	1-215		1 $\frac{1}{8}$	2-957
	2 $\frac{1}{4}$	18-057		1 $\frac{1}{4}$	2-429		1 $\frac{1}{4}$	4-436
2 $\frac{1}{2}$	1 $\frac{1}{8}$	1-056		1 $\frac{1}{2}$	3-644		1 $\frac{1}{2}$	5-914
	1 $\frac{1}{4}$	2-112		1 $\frac{3}{8}$	4-858		1 $\frac{3}{8}$	7-393
	1 $\frac{3}{8}$	3-168		1 $\frac{1}{2}$	6-072		1 $\frac{1}{2}$	8-871
	1 $\frac{1}{2}$	4-224		1 $\frac{3}{4}$	7-287		1 $\frac{3}{4}$	10-350
	1 $\frac{5}{8}$	5-280		1 $\frac{7}{8}$	8-502		1	11-828
	1 $\frac{3}{4}$	6-336		1	9-716		1 $\frac{1}{8}$	13-307
	1 $\frac{7}{8}$	7-392		1 $\frac{1}{8}$	10-931		1 $\frac{1}{4}$	14-785
	1	8-448		1 $\frac{1}{4}$	12-145		1 $\frac{1}{2}$	16-264
	1 $\frac{1}{8}$	9-504		1 $\frac{1}{2}$	13-360		1 $\frac{3}{8}$	17-742
	1 $\frac{1}{4}$	10-560		1 $\frac{3}{8}$	14-574		1 $\frac{1}{2}$	19-221
2 $\frac{3}{8}$	1 $\frac{1}{2}$	11-616	3	1	15-789		1 $\frac{3}{4}$	20-699
	1 $\frac{3}{8}$	12-672		1 $\frac{1}{8}$	17-003		1 $\frac{1}{2}$	22-178
	1 $\frac{1}{2}$	13-728		1 $\frac{1}{4}$	18-218		2	23-656
	1 $\frac{5}{8}$	14-784		2	19-432		2 $\frac{1}{4}$	26-613
	1 $\frac{3}{4}$	15-840		2 $\frac{1}{8}$	20-647		2 $\frac{1}{2}$	29-570
	1 $\frac{7}{8}$	16-896		2 $\frac{1}{4}$	21-861		2 $\frac{3}{4}$	32-527
	2	17-952		2 $\frac{3}{8}$	23-076		3	35-485
	2 $\frac{1}{8}$	19-008		2 $\frac{1}{2}$	24-290	3 $\frac{3}{4}$	3 $\frac{1}{4}$	38-441
	2 $\frac{1}{4}$	20-064		2 $\frac{3}{4}$	25-505		3 $\frac{1}{8}$	1-584
	2 $\frac{3}{8}$	1-109		2 $\frac{1}{2}$	26-719		1 $\frac{1}{8}$	3-168
2 $\frac{1}{4}$	1 $\frac{1}{8}$	2-218		1 $\frac{1}{8}$	1-267		1 $\frac{1}{4}$	4-752
	1 $\frac{1}{4}$	3-327		1 $\frac{1}{4}$	2-535		1 $\frac{1}{2}$	6-336
	1 $\frac{3}{8}$	4-436		1 $\frac{1}{2}$	3-802		1 $\frac{3}{8}$	7-921
	1 $\frac{1}{2}$	5-545		1 $\frac{3}{8}$	5-069		1 $\frac{1}{2}$	9-505
	1 $\frac{5}{8}$	6-654		1 $\frac{1}{2}$	6-337		1 $\frac{3}{4}$	11-089
	1 $\frac{3}{4}$	7-763		1 $\frac{7}{8}$	7-604		1	12-673
	1 $\frac{7}{8}$	8-872		1	8-871		1 $\frac{1}{8}$	14-257
	1	9-981		1 $\frac{1}{8}$	10-138		1 $\frac{1}{4}$	15-841
	1 $\frac{1}{4}$	11-090		1 $\frac{1}{4}$	11-406		1 $\frac{1}{2}$	17-425
	1 $\frac{3}{8}$	12-199		1 $\frac{1}{2}$	12-673		1 $\frac{3}{8}$	19-009
2 $\frac{3}{4}$	1 $\frac{1}{2}$	13-308		1 $\frac{3}{8}$	13-940		1 $\frac{1}{2}$	20-594
	1 $\frac{5}{8}$	14-417		1 $\frac{1}{2}$	15-208		1 $\frac{3}{4}$	22-178
	1 $\frac{3}{4}$	15-526		1 $\frac{7}{8}$	16-475		1 $\frac{7}{8}$	23-762
	1 $\frac{7}{8}$	16-635		1 $\frac{1}{2}$	17-742		2	25-346
	2	17-744		1 $\frac{3}{4}$	19-010		2 $\frac{1}{4}$	28-514
	2 $\frac{1}{8}$	18-853		2	20-277		2 $\frac{1}{2}$	31-682
	2 $\frac{1}{4}$	19-962		2 $\frac{1}{4}$	22-811		2 $\frac{3}{4}$	34-851
	2 $\frac{3}{8}$	21-071		2 $\frac{1}{2}$	25-346		3	38-019
	2 $\frac{1}{2}$	22-180		2 $\frac{3}{4}$	27-881		3 $\frac{1}{4}$	41-187
	1 $\frac{1}{8}$	1-162	3 $\frac{1}{4}$	1 $\frac{1}{8}$	1-373	4	3 $\frac{1}{2}$	44-355
2 $\frac{1}{2}$	1 $\frac{1}{4}$	2-323		1 $\frac{1}{4}$	2-746		1 $\frac{1}{8}$	1-690
	1 $\frac{3}{8}$	3-485		1 $\frac{1}{2}$	4-119		1 $\frac{1}{4}$	3-380
	1 $\frac{1}{2}$	4-647		1 $\frac{3}{8}$	5-492		1 $\frac{1}{2}$	6-759
	1 $\frac{5}{8}$	5-808		1 $\frac{1}{2}$	6-865		1 $\frac{3}{4}$	10-138
	1 $\frac{3}{4}$			1 $\frac{7}{8}$				

Breadth in inches.	Thick's in inches.	Weight in pounds.	Breadth in inches.	Thick's in inches.	Weight in pounds.	Breadth in inches.	Thick's in inches.	Weight in pounds.
4	1	13.518	4½	3¼	49.425	5	4¾	80.262
	1¼	16.897		3½	53.226		5¼	4.436
	1½	20.277		3¾	57.028		5½	8.871
	1¾	23.656		4	60.830		5¾	13.307
	2	27.036		4¼	64.632		6	17.722
	2¼	30.415		4½	4.003		1	11¼
	2½	33.795		4¾	8.026		1½	22.178
	2¾	37.174		5	12.038		1¾	26.613
	3	40.554		5¼	16.052		2	31.049
	3¼	43.933		5½	20.066		2¼	35.484
	3½	47.313		5¾	24.079		2½	39.920
	3¾	50.692		6	28.092		2¾	44.355
	4	1.795		6¼	32.105		3	48.791
	4¼	3.591		6½	36.118		3¼	53.226
	4½	7.181		6¾	40.131		3½	57.662
	4¾	10.772		7	44.144		3¾	62.097
4½	1	14.334	5	3	48.157	5½	4	66.533
	1¼	17.953		3¼	52.170		4½	70.938
	1½	21.544		3½	56.184		4¾	75.404
	1¾	25.135		3¾	60.197		5	79.839
	2	28.725		4	64.210		5¼	84.275
	2¼	32.316		4¼	68.223		5½	88.710
	2½	35.907		4½	72.235		5¾	4.647
	2¾	39.497		4¾	4.224		6	9.294
	3	43.088		5	8.449		6¼	13.940
	3¼	46.679		5¼	12.673		6½	18.587
	3½	50.269		5½	16.867		6¾	23.234
	3¾	53.860		5¾	21.122		7	27.881
	4	57.420		6	25.346		7¼	32.527
	4¼	3.802		6¼	29.570		7½	37.174
	4½	7.604		6½	33.755		7¾	41.821
	4¾	11.406		6¾	38.019		8	46.468
4¾	1	15.208	5½	2	42.243		8¼	51.114
	1¼	19.010		2¼	46.468		8½	55.761
	1½	22.812		2½	50.602		8¾	60.408
	1¾	26.614		2¾	54.916		9	65.055
	2	30.415		3	59.140		9¼	69.701
	2¼	34.217		3¼	63.365		9½	74.348
	2½	38.019		3½	67.589		9¾	78.995
	2¾	41.820		3¾	71.813		10	83.642
	3	45.623		4	76.038		10¼	88.288
				4¼			10½	92.935
				4½			10¾	
				4¾			11	
				5			11¼	
				5¼			11½	
				5½			11¾	
				5¾			12	

Example.—What is the weight of a bar of iron 4¾ inches in breadth by 1¼ inches thick?

Find 4¾ in the column of *Breadths*, and below it, in the column of *Thickness*, find 1¼; and opposite to that is 28.092, which is 28 lbs. and $\frac{92}{1000}$ of a lb. *Ans.*

NOTE.—The weight of cast iron being 1;

The weight of bar iron = 1.07

“ “ steel = 1.08

“ “ brass = 1.16

“ “ copper = 1.21

“ “ lead = 1.56

TABLE

OF

THE WEIGHT OF A LINEAL FOOT OF CAST IRON PIPES,

In lbs., from 1 inch to 30 inches Bore.

Bore.	Thickness.	Weight.	Bore.	Thickness.	Weight.	Bore.	Thickness.	Weight.
INCH.	INCHES.	POUNDS.	INCH.	INCHES.	POUNDS.	INCH.	INCHES.	POUNDS.
1	$\frac{1}{4}$	3.06	6	$\frac{1}{2}$	31.82	11	$\frac{1}{2}$	71.19
$1\frac{1}{4}$	$\frac{3}{8}$	5.05		$\frac{3}{8}$	40.56		$\frac{3}{8}$	86.40
	$\frac{1}{2}$	3.67		$\frac{1}{2}$	49.60		$\frac{1}{2}$	101.83
$1\frac{1}{2}$	$\frac{5}{8}$	6.		$\frac{5}{8}$	58.96	$11\frac{1}{2}$	$\frac{1}{2}$	117.60
$1\frac{3}{4}$	$\frac{3}{4}$	6.89	$6\frac{1}{2}$	$\frac{3}{4}$	34.32		$\frac{3}{4}$	58.82
2	$\frac{7}{8}$	9.80		$\frac{7}{8}$	43.68		$\frac{7}{8}$	74.28
	1	7.80		1	53.30		1	90.06
$2\frac{1}{4}$	$1\frac{1}{8}$	11.04	7	$1\frac{1}{8}$	63.18		$1\frac{1}{8}$	106.14
	$1\frac{1}{4}$	8.74		$1\frac{1}{4}$	36.66	12	$1\frac{1}{4}$	122.62
$2\frac{1}{2}$	$1\frac{3}{8}$	12.23		$1\frac{3}{8}$	46.80		$1\frac{3}{8}$	61.26
	$1\frac{1}{2}$	9.65		$1\frac{1}{2}$	56.96		$1\frac{1}{2}$	77.36
$2\frac{3}{4}$	$1\frac{5}{8}$	13.48		$1\frac{5}{8}$	67.60		$1\frac{5}{8}$	93.70
3	$1\frac{3}{4}$	10.57		$1\frac{3}{4}$	78.39		$1\frac{3}{4}$	110.48
	$1\frac{7}{8}$	14.66	$7\frac{1}{2}$	$1\frac{7}{8}$	39.22		$1\frac{7}{8}$	127.42
$3\frac{1}{4}$	$1\frac{7}{8}$	19.05		$1\frac{7}{8}$	49.92	$12\frac{1}{2}$	$1\frac{7}{8}$	63.70
	2	11.54		2	60.48		2	80.40
	$2\frac{1}{8}$	15.91		$2\frac{1}{8}$	71.76		$2\frac{1}{8}$	97.40
	$2\frac{1}{4}$	20.59		$2\frac{1}{4}$	83.28		$2\frac{1}{4}$	114.72
	$2\frac{3}{8}$	12.28	8	$2\frac{3}{8}$	41.64		$2\frac{3}{8}$	132.35
	$2\frac{1}{2}$	17.15		$2\frac{1}{2}$	52.68	13	$2\frac{1}{2}$	66.14
	$2\frac{5}{8}$	22.15		$2\frac{5}{8}$	64.27		$2\frac{5}{8}$	83.46
	$2\frac{3}{4}$	27.56		$2\frac{3}{4}$	76.12		$2\frac{3}{4}$	101.08
$3\frac{3}{4}$	$2\frac{3}{4}$	18.40		$2\frac{3}{4}$	88.20		$2\frac{3}{4}$	118.97
	3	23.72	$8\frac{1}{2}$	3	44.11		3	137.28
	$3\frac{1}{8}$	29.64		$3\frac{1}{8}$	56.16	$13\frac{1}{2}$	$3\frac{1}{8}$	68.64
$3\frac{1}{2}$	$3\frac{1}{8}$	19.66		$3\frac{1}{8}$	68.		$3\frac{1}{8}$	86.55
	$3\frac{1}{4}$	25.27		$3\frac{1}{4}$	80.50		$3\frac{1}{4}$	104.76
	$3\frac{3}{8}$	31.20		$3\frac{3}{8}$	93.28		$3\frac{3}{8}$	123.30
	$3\frac{1}{2}$	20.90		$3\frac{1}{2}$	46.50		$3\frac{1}{2}$	142.16
	$3\frac{5}{8}$	26.83	9	$3\frac{5}{8}$	58.92		$3\frac{5}{8}$	71.07
	$3\frac{3}{4}$	33.07		$3\frac{3}{4}$	71.70	14	$3\frac{3}{4}$	89.61
4	$3\frac{3}{4}$	22.05		$3\frac{3}{4}$	84.70		$3\frac{3}{4}$	108.46
	4	28.28		4	97.98		4	127.60
	$4\frac{1}{8}$	34.94	$9\frac{1}{2}$	$4\frac{1}{8}$	48.98		$4\frac{1}{8}$	147.03
	$4\frac{1}{4}$	23.35		$4\frac{1}{4}$	62.02	$14\frac{1}{2}$	$4\frac{1}{4}$	73.72
	$4\frac{3}{8}$	29.85		$4\frac{3}{8}$	75.32		$4\frac{3}{8}$	92.66
	$4\frac{1}{2}$	36.73		$4\frac{1}{2}$	88.98		$4\frac{1}{2}$	112.10
	$4\frac{5}{8}$	24.49		$4\frac{5}{8}$	102.90		$4\frac{5}{8}$	131.86
	$4\frac{3}{4}$	31.40	10	$4\frac{3}{4}$	51.46		$4\frac{3}{4}$	151.92
	$4\frac{7}{8}$	38.58		$4\frac{7}{8}$	65.08	15	$4\frac{7}{8}$	75.96
$4\frac{3}{4}$	$4\frac{7}{8}$	25.70		$4\frac{7}{8}$	78.99		$4\frac{7}{8}$	95.72
	5	32.91		5	93.24		5	115.78
	$5\frac{1}{8}$	40.43		$5\frac{1}{8}$	108.84		$5\frac{1}{8}$	136.15
5	$5\frac{1}{8}$	26.94	$10\frac{1}{2}$	$5\frac{1}{8}$	53.88		$5\frac{1}{8}$	156.82
	$5\frac{1}{4}$	34.34		$5\frac{1}{4}$	68.14	$15\frac{1}{2}$	$5\frac{1}{4}$	78.40
	$5\frac{3}{8}$	42.28		$5\frac{3}{8}$	82.68		$5\frac{3}{8}$	98.78
	$5\frac{1}{2}$	29.40		$5\frac{1}{2}$	97.44		$5\frac{1}{2}$	119.48
	$5\frac{5}{8}$	37.44		$5\frac{5}{8}$	112.68		$5\frac{5}{8}$	140.40
	$5\frac{3}{4}$	45.94	11	$5\frac{3}{4}$	56.34		$5\frac{3}{4}$	161.82

Bore.	Thickness.	Weight.	Bore.	Thickness.	Weight.	Bore.	Thickness.	Weight.
INCH.	INCHES.	POUNDS.	INCH.	INCHES.	POUNDS.	INCH.	INCHES.	POUNDS.
16	$\frac{1}{8}$	80·87	18	1	186·24	24	$\frac{7}{8}$	213·23
	$\frac{3}{8}$	101·82	19	$\frac{1}{8}$	120·24		1	245·08
	$\frac{1}{2}$	123·14		$\frac{3}{8}$	145·20	25	$\frac{5}{8}$	156·97
	$\frac{3}{4}$	144·76		$\frac{1}{2}$	170·47		$\frac{3}{4}$	189·23
16½	1	166·60	20	1	195·92		$\frac{7}{8}$	221·94
	$\frac{1}{8}$	83·30		$\frac{3}{8}$	126·33	26	1	254·86
	$\frac{3}{8}$	104·82		$\frac{1}{2}$	152·53		$\frac{3}{4}$	196·62
	$\frac{1}{2}$	126·79		$\frac{3}{4}$	179·02		$\frac{7}{8}$	230·56
	$\frac{3}{4}$	149·02	21	1	205·80		1	264·66
17	1	171·60		$\frac{1}{8}$	132·50	27	$\frac{3}{4}$	204·04
	$\frac{1}{8}$	85·73		$\frac{3}{8}$	159·84		$\frac{7}{8}$	239·08
	$\frac{3}{8}$	107·96		$\frac{1}{2}$	187·60		1	274·56
	$\frac{1}{2}$	130·48		$\frac{3}{4}$	215·52	28	$\frac{3}{4}$	211·32
	$\frac{3}{4}$	153·30	22	$\frac{1}{8}$	138·60		$\frac{7}{8}$	247·62
17½	1	176·58		$\frac{3}{8}$	167·24		1	284·28
	$\frac{1}{8}$	88·23		$\frac{1}{2}$	196·46	29	$\frac{3}{4}$	218·70
	$\frac{3}{8}$	111·06		$\frac{3}{4}$	225·38		$\frac{7}{8}$	256·20
	$\frac{1}{2}$	134·16	23	1	144·77		1	294·02
	$\frac{3}{4}$	157·59		$\frac{1}{8}$	174·62	30	$\frac{3}{4}$	226·20
18	1	181·33		$\frac{3}{8}$	204·78		$\frac{7}{8}$	264·79
	$\frac{1}{8}$	114·10	24	1	235·28		1	303·86
	$\frac{3}{8}$	137·84		$\frac{1}{2}$	150·85		$\frac{3}{4}$	343·20
	$\frac{1}{2}$	161·90		$\frac{3}{4}$	181·92		1	

TABLE,
EXHIBITING THE WEIGHT
OF
MALLEABLE IRON, COPPER, AND LEAD PIPES,
12 inches long, of various thicknesses, and any diameter required.

Thickness.	Malleable Iron.	Copper.	Lead.
IN.			
$\frac{1}{32}$	·104	121	·1539
$\frac{1}{16}$	·208	·2419	·3078
$\frac{3}{32}$	·3108	·3623	·4616
$\frac{1}{8}$	·414	·4838	·6155
$\frac{1}{8}$ and $\frac{1}{32}$	·518	·6047	·7694
$\frac{1}{8}$ and $\frac{1}{16}$	·621	·7258	·9282
$\frac{1}{8}$ and $\frac{1}{32}$	·725	·8466	1·0771
$\frac{1}{4}$	·828	·9678	1·231

TABLE, SHOWING THE WEIGHT

Of Solid Cylinders of Cast Iron, 12 inches long, in Avoirdupois pounds.

Inches Diam.	Weight in lbs.	Inches Diam.	Weight in lbs.	Inches Diam.	Weight in lbs.	Inches Diam.	Weight in lbs.
$\frac{3}{8}$	1·394	$2\frac{1}{8}$	15·492	$4\frac{1}{2}$	50·193	8	158·638
$\frac{7}{8}$	1·897	$2\frac{3}{8}$	17·080	$4\frac{3}{4}$	55·926	$8\frac{1}{2}$	179·087
1	2·478	$2\frac{1}{2}$	18·745	5	61·968	9	200·774
$1\frac{1}{8}$	3·137	$2\frac{7}{8}$	20·488	$5\frac{1}{4}$	68·319	$9\frac{1}{2}$	223·704
$1\frac{1}{4}$	3·873	3	22·308	$5\frac{1}{2}$	74·981	10	247·872
$1\frac{3}{8}$	4·686	$3\frac{1}{8}$	24·206	$5\frac{3}{4}$	81·925	$10\frac{1}{2}$	273·278
$1\frac{1}{2}$	5·577	$3\frac{1}{4}$	26·181	6	89·234	11	299·925
$1\frac{3}{4}$	6·545	3	28·234	$6\frac{1}{4}$	96·825	$11\frac{1}{2}$	327·811
$1\frac{7}{8}$	7·591	$3\frac{3}{8}$	30·364	$6\frac{1}{2}$	104·726	12	356·935
2	8·714	3	32·572	$6\frac{3}{4}$	112·936	13	418·903
$2\frac{1}{8}$	9·915	$3\frac{1}{2}$	34·857	7	121·457	14	485·830
$2\frac{1}{4}$	11·193	$3\frac{7}{8}$	37·219	$7\frac{1}{4}$	130·287	15	557·712
$2\frac{3}{8}$	12·548	4	39·660	$7\frac{1}{2}$	139·428	16	634·552
$2\frac{1}{2}$	13·981	$4\frac{1}{4}$	44·771	$7\frac{3}{4}$	148·878		

NOTE.—Cubic inches of cast iron \times ·263 = lbs. avoirdupois.
Circular inches of cast iron \times ·2065 = lbs. avoirdupois.

TABLE, SHOWING THE CAPACITY AND WEIGHT

Of Cast Iron and Lead Balls, from 1 inch to $8\frac{1}{2}$ diameter.

Inches Diam.	Capacity in cubic inches.	Cast Iron. lbs.	Lead. lbs.	Inches Diam.	Capacity in cubic inches.	Cast Iron. lbs.	Lead. lbs.
1	·523	·136	·215	5	65·450	17·063	26·843
$1\frac{1}{2}$	1·767	·461	·725	$5\frac{1}{2}$	87·114	22·721	35·729
2	1·189	1·092	1·718	6	113·097	29·484	46·385
$2\frac{1}{2}$	8·181	2·133	3·355	$6\frac{1}{2}$	143·793	37·453	58·976
3	14·137	3·685	5·798	7	179·594	46·820	73·659
$3\frac{1}{2}$	22·449	5·852	9·207	$7\frac{1}{2}$	220·893	57·587	90·598
4	33·510	8·736	13·744	8	268·082	69·889	109·552
$4\frac{1}{2}$	47·713	12·439	19·569	$8\frac{1}{2}$	321·555	83·840	131·883

TABLE, SHOWING THE NUMBER OF NAILS AND SPIKES TO THE POUND

OF VARIOUS SIZES,

As manufactured at the Troy Iron and Nail Factory, N. Y.

Size of Nails.	Number to the lb.	Boat Spikes.	Diameter of Rod.	No. Spikes to the lb.	Ship Spikes.	Diameter of Rod.	No. Spikes to the lb.
3 penny	600	No. 4	$\frac{1}{4}$	13	No. 4	$\frac{5}{16}$	8
4 "	360	" 5	$\frac{5}{16}$	8	" 5	$\frac{3}{8}$	6
6 "	200	" 6	$\frac{3}{8}$	5	" 6	$\frac{7}{8}$	5
8 "	110	" 7	$\frac{7}{8}$	4	" 7	$\frac{1}{2}$	$3\frac{1}{2}$
10 "	88				" 8	$\frac{3}{4}$	3
12 "	68				" 9	$\frac{9}{16}$	2
20 "	40				" 10	$\frac{1}{2}$	$1\frac{1}{2}$

TABLE

OF

PRACTICAL FORMULA,

By which to determine the Amount of Weight a Column of given dimensions will support in lbs.

For a rectangular column of cast iron, . . . $W = \frac{15300 \, l \, b^3}{4 \, b^2 + \cdot 18 \, l^2}$

For a rectangular column of malleable iron, $W = \frac{17800 \, l \, b^3}{4 \, b^2 + \cdot 16 \, l^2}$

For a rectangular column of oak, . . . $W = \frac{3960 \, l \, b^3}{4 \, b^2 + \cdot 5 \, l^2}$

For a solid cylinder of cast iron, . . . $W = \frac{9562 \, d^4}{4 \, d^2 + \cdot 18 \, l^2}$

For a solid cylinder of malleable iron, . . $W = \frac{11125 \, d^4}{4 \, d^2 + \cdot 16 \, l^2}$

For a solid cylinder of oak, $W = \frac{2470 \, d^4}{4 \, d^2 + \cdot 5 \, l^2}$

NOTE—W = the weight the column will support, in lbs.

b = the breadth in inches.

l = the length in feet.

d = the diameter in inches.

Example 1.—A rectangular column of oak, 6 inches on the side, and 12 feet in length.—What weight will it support?

$$\frac{3960 \times 12 \times 6^3}{4 \times 6^2 + \cdot 5 \times 12^2} = \frac{10264320}{216} = 47520 \text{ lbs.}$$

Example 2.—What weight will a cast iron cylinder support, whose diameter is 4 inches, and length 10 feet?

$$\frac{9562 \times 5^4}{4 \times 5^2 + \cdot 18 \times 10^2} = \frac{5976250}{118} = 50646 \text{ lbs.}$$

TABLE,

TO SHOW THE WEIGHT OR PRESSURE

A Column of Cast Iron will sustain with safety.

Length or Height in feet.	8	10	12	14	16	18	20	22	24
Diameter.	Weight in cwt.	Weight in cwt.	Weight in cwt.	Weight in cwt.	Weight in cwt.	Weight in cwt.	Weight in cwt.	Weight in cwt.	Weight in cwt.
2½ inches.	91	77	65	55	47	40	34	29	25
3 —	145	128	111	97	84	73	64	56	49
3½ —	214	191	172	156	135	119	106	94	83
4 —	288	266	242	220	198	178	160	144	130
4½ —	379	354	327	301	275	251	229	208	189
5 —	479	452	427	394	365	337	310	285	262
6 —	573	550	525	497	469	440	413	386	360
7 —	989	959	924	887	848	808	765	725	686
8 —	1289	1259	1224	1185	1142	1097	1052	1005	959
9 —	1672	1640	1603	1561	1515	1467	1416	1364	1311
10 —	2077	2045	2007	1964	1916	1865	1811	1755	1697
11 —	2520	2490	2450	2410	2358	2305	2248	2189	2127
12 —	3020	2970	2930	2900	2830	2780	2730	2670	2600

TABLE
OF
THE WEIGHT OF LEAD PIPE PER YARD,
From $\frac{1}{4}$ to $4\frac{1}{2}$ inches Diameter.

DIAMETER.	WEIGHT. lbs. oz.	DIAMETER.	WEIGHT. lbs. oz.
$\frac{1}{4}$ inch medium	3	$1\frac{1}{2}$ inch extra light	9
“ strong	4	“ light	13
$\frac{1}{2}$ inch light	3	“ medium	15 8
“ medium	4	“ strong	19
“ strong	5	$1\frac{3}{4}$ inch medium	16
“ extra strong	6 4	“ strong	20
$\frac{3}{8}$ inch light	5	2 inch light	16 12
“ medium	6 8	“ medium	20
“ strong	7 8	“ strong	23
“ extra strong	8 4	$2\frac{1}{2}$ inch light	25
$\frac{3}{4}$ inch extra light	5	“ medium	30
“ light	6 4	“ strong	35
“ medium	8	3 inch light	30
“ strong	9 12	“ medium	35
“ extra strong	10 8	“ strong	44
1 inch extra light	6 8	$3\frac{1}{2}$ inch medium	45
“ light	8 5	“ strong	54
“ medium	10 5	“ extra strong	70
“ strong	12 4	4 inch waste, light	
$1\frac{1}{4}$ inch extra light	8 5	“ “ medium	21
“ light	9 12	“ “ strong	26
“ medium	11	$4\frac{1}{2}$ inch “ light	
“ strong	12 8	“ “ medium	24
“ extra strong	14 10	“ “ strong	29

VERY LIGHT PIPE.

DIAMETER.	WEIGHT. lbs. oz.	DIAMETER.	WEIGHT. lbs. oz.
$\frac{1}{4}$ inch	1	$\frac{3}{4}$ inch	3 6
“	$1\frac{1}{2}$	1 “	5 8
$\frac{1}{2}$ “	2	$1\frac{1}{4}$ “	6 14
$\frac{3}{8}$ “	$2\frac{1}{2}$		

TABLE,
SHOWING THE WEIGHT
*Of Copper Pipes 12 inches in length, and from $\frac{1}{2}$ inch to 3 inches in diameter,
and $\frac{1}{8}$ of an inch in thickness.*

Diameter of Bore.	Weight. lbs.	Diameter of Bore.	Weight. lbs.	Diameter of Bore.	Weight. lbs.	Diameter of Bore.	Weight. lbs.
IN.		IN.		IN.		IN.	
$\frac{1}{2}$	.94	$1\frac{1}{4}$	2.08	$1\frac{1}{8}$	3.03	$2\frac{1}{2}$	3.97
$\frac{3}{4}$	1.33	$1\frac{3}{4}$	2.23	2	3.21	$2\frac{3}{8}$	4.12
$\frac{7}{8}$	1.51	$1\frac{7}{8}$	2.42	$2\frac{1}{4}$	3.39	$2\frac{3}{4}$	4.34
1	1.69	$1\frac{5}{8}$	2.67	$2\frac{1}{2}$	3.58	$2\frac{7}{8}$	4.56
$1\frac{1}{8}$	1.89	$1\frac{3}{4}$	2.87	$2\frac{3}{4}$	3.78	3	4.78

STRENGTH OF MATERIALS

TABLE OF THE COHESIVE FORCE OF METALS, &c.

Weight or Force necessary to tear asunder 1 Square Inch, in Avoirdupois Pounds.

METALS.

	lbs.		lbs.
Copper, cast	22-500	Iron, wire	85-700-113
" wire	61-200	" medium bar	60-000
Iron, cast; gray, 2 fusion	30-680	" inferior bar	30-000
" English	52-000	Lead, cast	880
" French	70-000	" milled	3-320
" " soft	63-600	Silver wire	38-257
" German	68-300	Steel, soft	120-000
Iron, wrought	60-000	" fine	135-000
" Swedish	72-000	" razor, tempered	150-000
" German	69-000		

WOODS.

	lbs.		lbs.
Ash, white, seasoned	14-000	Mahogany	21-800
" red, seasoned	17-800	" Spanish	12-000
Birch	15-000	Maple	10-500
Bay	14-500	Oak, American, white	11-500
Beech	11-500	" English	10-000
Box	20-000	" seasoned	13-600
Cedar	11-400	Pine, pitch	12-000
Chestnut, sweet	10-500	" Norway	13-000
Elm	13-400	Sycamore	13-000
Fir, strongest	12-000	Walnut	17-800
" American	8-800	Willow	13-000
Locust	20-500		

ON THE RESISTANCE TO CRUSHING WOOD.

According to the experiments of Rondelet, made on a hydrostatic press, on cubes of an inch in length, it required from 5000 to 6000 pounds per square inch to crush *oak* and under this pressure its length was diminished more than $\frac{1}{3}$. To crush *fir*, it required from 6000 to 7000 pounds per square inch, and the length was reduced $\frac{1}{2}$. Mr. Rennes' trials, which are considered the most precise on this subject, afforded results considerably lower than those of Rondelet. The following are the results of his experiments:

Base 1 inch square, height 1 inch,	Elm was crushed by	1284 lbs.
" " " " "	White deal, "	1928 "
" " " " "	American pine "	1606 "
" " " " "	English oak "	3860 "
" " " " "	African teak "	8480 "
" " " " "	" " "	5147 "
" 3 inches square, length 6 to 9,	" oak "	60480 "

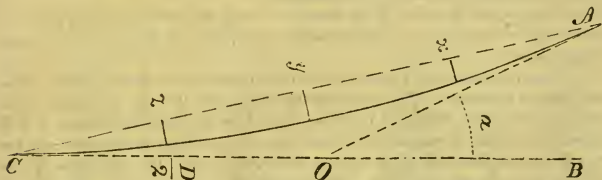
The load a piece of timber will bear, when pressed in the direction of its length, without risk of being crushed, may be found by the following rule, when the pressure is exactly in the axis of the piece:

Rule.—Multiply the area of the piece in inches by the weight that has been found capable of crushing a square inch of the same kind of wood. (*See the preceding experiments.*) Then *one-fourth* of the product will give the greatest load in pounds that the piece would bear with safety.

HINTS

ABOUT LAYING OUT CURVES.

IN laying out curves, the following method has the advantages of great accuracy and expedition over that of angles taken by an instrument. *The stations are supposed to be 100 feet apart.*



In the cut, the chord AC is divided into four equal parts: the middle ordinate, y , is expressed by $2 \times 2 = 4$, and x and z are expressed by $1 \times 3 = 3$.

Measure at the intersection the angle, AOB , in the above figure, of the two straight lines to be joined, by observing the quantity of deflection in 100 feet; that is, *the length of the arc, as of a circle comprehended between the angular lines*, the radius of the arc being 100 feet. When the angle is small, the length of the chord is sufficiently accurate. Divide this quantity by the number of stations you propose to give the curve. The quotient is D hereafter mentioned. $\frac{10000}{D}$ is R , radius of the curve, or reciprocally, $\frac{10000}{R}$ is D deflection. Produce the tangent, 100 feet beyond the commencement of the curve, and set off so as to form an isosceles triangle $\frac{D}{2}$. You have then obtained the first station on the curve. Produce the first chord 100 feet beyond this station, and set off D . Proceed in like manner, setting off D at each station. Having completed the curve, produce the last chord 100 feet, and set off $\frac{D}{2}$. The point thus obtained, and the end of the curve, form the line of the tangent.

Having completed a curve as above, if you do not arrive at the destined point, measure the variation, v , and divide it among the stations in proportion to the square of the distance from the point of commencement.

To find what difference of direction will be obtained for the tangent by making the offset of the above-mentioned variation, v , divide twice the variation by the number of stations. The quotient $\frac{2v}{n}$, is the difference of direction for one station.

In running a curve for laying of track upon a finished grading, if, both ends being adjusted, the curve varies at intermediate points from the grading, measure the variation v , at the point g , where it is greatest, or assume some quantity v , that shall be a judicious average of variations. In making the change, it will not be proper to occupy less than 4 stations on each side of the point g , making 8 stations in all. *If 8 stations are occupied*, set off on each side of g , at the 3d station therefrom, $\frac{1}{8}v$; then, proceeding towards g , set off successively at the stations, $\frac{4}{8}, \frac{7}{8}, \frac{8}{8}, v$. *If 12 stations are to be occupied*, set off at 5 stations from g , $\frac{1}{8}v$; then successively toward g , $\frac{4}{18}, \frac{9}{18}, \frac{14}{18}, \frac{17}{18}, \frac{18}{18}v$. These fractions can always be obtained as follows: Decide upon some even number of stations to be used on each side of g . The denominator is $\frac{1}{2}$ the square of the number n , of stations on one side of g , and the numerators are found by

deducting from the denominators successively the square numbers 1, 4, 9, 16, 25, &c., till the remainder is a perfect square, which will be one-half the denominators, and consequently the square of $\frac{1}{2}n$. It will also be arrived at in $\frac{1}{2}n$ from g . Thus, if 14 be decided upon as the number of stations on each side g , 98 will be the denominator, and the numerators will be, successively, 98, 97, 94, 89, 82, 73, 62, 49. This last number is $\frac{1}{2}$ the denominator, and 7 stations from g . It is likewise 7^2 . The remaining numerators are, inversely, the succession of square numbers previously deducted from the numerators. Thus, continuing the above example from 49, we have 36, 25, 16, 9, 4, 1. If necessary, the numerator may be preserved equal to the denominator on either side of g , for an indefinite period before diminishing.

For distances not exceeding 20° in length on curves, the offsets from a tangent are (sufficiently near for practice) in proportion to the squares of the distances from the commencement.

It is proper in laying out a curve by this rule to measure the distances, both on the curve and on the tangent. For approximation in the field, this rule is valuable for a distance of 40° ; after which it is rather unsafe, and for 90° absolutely useless. It will be found serviceable for calculating vertical curves in a profile of grades, measuring the angle of the two planes, as of the lines in horizontal curves. The calculation by this rule always exceeds the true offset. The excess for 20° on a 1° curve (radius 5730), is 1.14 feet; for 30° , 5.86 feet; for 60° , 94 feet; and for 90° , 490 feet. For 10° , the variation is scarcely perceptible.

To obtain ordinates from a chord, observe the three following rules:

1. The deflection D for chords is in proportion to the square of their lengths.
2. The ordinate at the middle of a chord is always $\frac{D}{8}$.
3. All the ordinates of a chord are in proportion to the rectangle of the two parts into which they divide the chord. Thus, divide the chord into 10 parts, equal; the middle ordinate will be expressed by $5 \times 5 = 25$; and the others will be successively expressed by

$$4 \times 6 = 24; 3 \times 7 = 21; 2 \times 8 = 16; \text{ and } 1 \times 9 = 9.$$

Where R is 5000, and the chord 100, D is 2, or $\frac{10000}{R}$, and the middle ordinate is 25; the others are 24, 21, 16, and .09, on each side the centre.

In the cut, the chord AC is divided into four equal parts: the middle ordinate, y , is expressed by $2 \times 2 = 4$, and x and z are expressed by $1 \times 3 = 3$; and xz are therefore each $\frac{3}{4}$ of y .

The 1st and 2d of these rules will be found useful for springing rails of any length, or any radius of curvature. Thus, for 100 feet chord, the middle ordinate is .25; for an 18 feet rail, the middle ordinate: 25 as $18 \times 18 = .324$; $100 \times 100 = 10000$; or .0324 — $.0324 \times 25 = .0081$ feet; or .0972 inch, or for practice $\frac{1}{10}$ inch.

The difference in length, between the inner and the outer rail, may be determined as follows: Where R is radius, C the length of the inner rail, and W the width of the track, the difference is $\frac{CW}{R}$. Where 5 feet is the width, $\frac{500}{R}$ is the difference for 100 feet, and $\frac{R}{20}$ is the length required to gain 3 inches. This formula will be found convenient for distributing overlength iron for curves.

TABLE

FOR

ASCERTAINING THE SUPERFICIAL QUANTITY OF LAND

For Railroads and Canals.

1		51		101		151	
Number.							
1	·0000230	51	·0011708	101	·0023186	151	·0034665
2	·0000459	2	·0011938	2	·0023416	2	·0034894
3	·0000689	3	·0012167	3	·0023646	3	·0035124
4	·0000918	4	·0012397	4	·0023875	4	·0035353
5	·0001148	5	·0012626	5	·0024105	5	·0035583
6	·0001377	6	·0012856	6	·0024334	6	·0035813
7	·0001607	7	·0013085	7	·0024564	7	·0036042
8	·0001837	8	·0013315	8	·0024793	8	·0036272
9	·0002066	9	·0013545	9	·0025023	9	·0036501
10	·0002296	60	·0013774	110	·0025252	160	·0036731
1	·0002525	1	·0014004	1	·0025482	1	·0036960
2	·0002755	2	·0014233	2	·0025712	2	·0037190
3	·0002984	3	·0014463	3	·0025941	3	·0037420
4	·0003214	4	·0014692	4	·0026171	4	·0037649
5	·0003444	5	·0014922	5	·0026400	5	·0037879
6	·0003673	6	·0015151	6	·0026630	6	·0038108
7	·0003903	7	·0015381	7	·0026859	7	·0038338
8	·0004132	8	·0015611	8	·0027089	8	·0038567
9	·0004362	9	·0015840	9	·0027319	9	·0038797
20	·0004591	70	·0016070	120	·0027548	170	·0039027
1	·0004821	1	·0016299	1	·0027778	1	·0039256
2	·0005050	2	·0016529	2	·0028007	2	·0039486
3	·0005280	3	·0016758	3	·0028237	3	·0039715
4	·0005510	4	·0016988	4	·0028466	4	·0039945
5	·0005739	5	·0017218	5	·0028696	5	·0040174
6	·0005969	6	·0017447	6	·0028926	6	·0040404
7	·0006198	7	·0017677	7	·0029155	7	·0040634
8	·0006428	8	·0017906	8	·0029385	8	·0040863
9	·0006657	9	·0018136	9	·0029614	9	·0041093
30	·0006887	80	·0018365	130	·0029844	180	·0041322
1	·0007117	1	·0018595	1	·0030073	1	·0041552
2	·0007346	2	·0018825	2	·0030303	2	·0041781
3	·0007576	3	·0019054	3	·0030533	3	·0042011
4	·0007805	4	·0019284	4	·0030762	4	·0042241
5	·0008035	5	·0019513	5	·0030992	5	·0042470
6	·0008264	6	·0019743	6	·0031221	6	·0042700
7	·0008494	7	·0019972	7	·0031451	7	·0042929
8	·0008724	8	·0020202	8	·0031680	8	·0043159
9	·0008953	9	·0020432	9	·0031910	9	·0043388
40	·0009183	90	·0020661	140	·0032140	190	·0043618
1	·0009412	1	·0020891	1	·0032369	1	·0043847
2	·0009642	2	·0021120	2	·0032599	2	·0044077
3	·0009871	3	·0021350	3	·0032828	3	·0044307
4	·0010101	4	·0021579	4	·0033058	4	·0044536
5	·0010331	5	·0021809	5	·0033287	5	·0044766
6	·0010560	6	·0022039	6	·0033517	6	·0044995
7	·0010790	7	·0022268	7	·0033746	7	·0045225
8	·0011019	8	·0022498	8	·0033976	8	·0045454
9	·0011249	9	·0022727	9	·0034206	9	·0045684
50	·0011478	100	·0022957	150	·0034435	200	·0045914

EXEMPLIFICATION OF THE TABLE

For ascertaining the quantity of Land necessary for the formation of a Railway, Canal, or Road.

Rule.—Add together any two adjacent heights or depths of cuttings; multiply the same by the ratios of the slopes in the cuttings or embankments; add to this product the width of the cutting at bottom or embankment at top, and look for the sum in the side columns in the table; take out the corresponding tabular number, which number, multiplied by the *length in feet*, between the heights, will give the acres and decimal parts of an acre that will be required for the given cutting.

Example.—Required the superficial quantity of land for a railroad of the following dimensions:

Heights.	Ratio of Slope.	Base.	Length.
20+30	2½ to 1	30	400 feet

$$20+30 \times 2.5 + 30 = 155.$$

Tabular number corresponding to 155 = .0035583

Length 400

Acres and decimals 1.4233200

or, 1 acre, 1 rood, and 19 perches.

NOTE.—Should the sum of any two heights or depths of cutting exceed any given number in the table, take out the tabular number for 200, and add to it alternately as many times 229 and 230 as the number exceeds 200, the sum will be the number sought.

Thus, if the two adjacent heights be 30 and 50; then as before:

$$30 + 50 \times 2.5 + 30 = 220$$

Tabular number for 200 = .0045914

Then 10 times 229 = 4590

and 10 times 230 = 4590

.0050504, the true number.

TABLE,

SHOWING THE AMOUNT OF WAGES

Per Week and Year, at a given sum per Hour, Day, &c.

NEW YORK CURRENCY.				NEW ENGLAND CURRENCY.			
Per Hour.	Per Day of 10 hours.	Per Week of 6 days.	Per Year of 52 weeks.	Per Hour.	Per Day of 10 hours.	Per Week of 6 days.	Per Year of 52 weeks.
cts. mills.	\$ cts.	\$ cts.	\$ cts.	cts. mills.	cts. mills.	\$ cts.	\$ cts.
2.5	0.25	1.50	75.00	1.7	16.7	1.00	52.00
3.1	0.31½	1.87½	97.50	2.5	25.0	1.50	78.00
3.7	0.37½	2.25	117.00	3.3	33.3	2.00	104.00
4.4	0.43½	2.62½	136.50	4.2	41.6	2.50	130.00
5.0	0.50	3.00	156.00	5.0	50.0	3.00	156.00
5.6	0.56½	3.37½	174.50	5.8	58.3	3.50	178.00
6.2	0.62½	3.75	195.00	6.7	66.7	4.00	208.00
6.9	0.68½	4.12½	214.50	7.5	75.0	4.50	234.00
7.5	0.75	4.50	232.00	8.3	83.3	5.00	260.00
8.1	0.81½	4.87½	253.50	10.0	100.0	6.00	312.00
8.7	0.87½	5.25	273.00	11.7	116.7	7.00	364.00
9.4	0.93½	5.62½	292.50	12.5	125.0	7.50	390.00
10.0	1.00	6.00	312.00	13.3	133.3	8.00	416.00
11.2	1.12½	6.75	351.00	14.1	141.6	8.50	441.79
12.5	1.25	7.50	390.00	15.0	150.0	9.00	468.00
13.7	1.37½	8.25	429.00	16.7	166.7	10.00	520.00
15.0	1.50	9.00	468.00	17.5	183.0	10.00	536.00
17.5	1.75	10.50	546.00	20.0	200.0	12.00	624.00
20.0	2.00	12.00	624.00	22.5	225.0	13.50	702.00

TABLE,
SHOWING THE DIFFERENCE OF LEVEL.

Distance.	Dif. of Level.	Distance.	Dif. of Level.	Dist'nce.	Dif. of Level.	Dist'ce.	Dif. of Level.
yards.	inches.	yards.	inches.	miles.	ft. in.	miles.	ft. in.
100	0 026	1000	2 570	$\frac{1}{4}$	0 0 $\frac{1}{2}$	7	32 6
200	0 103	1100	3 110	$\frac{1}{2}$	0 2	8	42 6
300	0 231	1200	3 701	$\frac{3}{4}$	0 4 $\frac{1}{2}$	9	53 9
400	0 411	1300	4 344	1	0 8	10	66 4
500	0 643	1400	5 038	2	2 8	11	80 3
600	0 925	1500	5 784	3	6 0	12	95 7
700	1 200	1600	6 580	4	10 7	13	112 2
800	1 645	1700	7 425	5	16 7	14	130 1
900	2 081			6	23 11		

USE OF THE ABOVE TABLE.—*First.* To find the height of the apparent level above the true.

Second. To find the extent of the visible horizon, or how far can be seen from any given height, on a horizontal plane, as at sea, &c. Suppose the eye of an observer on the top of a ship's mast, at sea, is at the height of 130 feet above the water, he will then see about 14 miles all around.

Third. Suppose a spring to be on one side of a hill, and a house on the opposite hill, with a valley between them, and that the spring, seen from the house, appears, by a leveling instrument, to be on a level with the foundation of the house, which, suppose, is at a mile distance from it—then is the spring eight inches above the true level of the house; and this difference would be barely sufficient for the water to be brought in pipes from the spring to the house; the pipes being laid all the way in the ground.

Lastly. If the height or distance exceed the limits of the table, then first, (if the distance be given,) divide it by 2 or by 3, or by 4, &c., till the quotient comes within the distances in the table; then take the height answering to the quotient, and multiply it by the square of the divisor, that is, by 4 or 9, or 16 for the height required.

TABLE,
OF
THE CURVATURE OF THE EARTH.

Dist. in miles.	Height.	Dist. in miles.	Height.	Dist. in miles.	Height.	Dist. in miles.	Height.
	inches.		ft. in.		feet.		feet.
$\frac{1}{4}$	$\frac{1}{2}$	7	32 5	15	149	40	1064
$\frac{1}{2}$	2	8	42 5	16	170	45	1346
1	8	8	53 8	17	192	50	1662
	ft. in.	10	66 4	18	215	60	2394
2	2 6	11	80 2	19	240	70	3258
3	6	12	95 4	20	266	80	4255
4	10 6	13	112	25	415	90	5386
5	16 6	14	130	30	599	100	6649
6	23 9			35	814		

EARTHWORK IN CANALS.

THE following methods are those generally used in calculating the quantity of earthwork in canals:

FIRST METHOD.

Rule.—To the bottom breadth add the two heights, that sum, multiplied by the sum of the heights, and from the product deduct the rectangle of the two heights; the difference, multiplied by half the length, will give the true content of the section.

SECOND METHOD.

Rule.—Add the greater depth and bottom breadth together, multiply this sum by the sum of the two heights, and to the product add the square of the lesser height; this sum, multiplied by half the length, gives the content of the section.

The difference between taking a mean or middle dimension in any piece of cutting or irregular solid and the true method, is, the square of the difference of the two heights, multiplied by $\frac{1}{8}$ of the length of the section.

THIRD METHOD.

CASE I.

In any even cutting, where the cross section is the same.

Rule.—Multiply the perpendicular depth of the section by the ratio of the slopes; to this product add the bottom width of the canal; multiply this sum again by the depth of the section, and this last product will be the area of the section, in the same dimensions as the measures were taken.

The ratio of the slopes is the length of the horizontal set-off, answering to one in the perpendicular.

CASE II.

When any two sections are of unequal depths, and the ground between them has a regular descent or ascent.

Rule.—Add together the perpendicular depths of the two sections, and square the sum; from this square subtract the product of the two depths, multiplied by each other: multiply the remainder by one-third the ratio of the slopes, and reserve the product. Again multiply the sum of the two depths by half the bottom width of the canal, and to this product add the product before reserved. This sum will be the *mean area* between the two sections; the same as before with regard to the dimensions.

CASE III

In any piece of cutting, where the ground-surface at one end is exactly the bottom-level of the canal.

Rule.—Multiply the square of the perpendicular depth of the section; at the other end by $\frac{1}{2}$ of the ratio of the slopes. To this product add the depth of the section, multiplied by half the bottom width of the canal; the sum will be the mean area, as before.

In any of these cases, the mean area multiplied by the length of the piece gives the solid contents without any benching. The content of the benching may be thus found.

Rule.—From the perpendicular depth of each section, subtract the depth of the canal to top bank level; add the two remainders together, and multiply half their sum by the whole width of the benchings on both sides, for a mean area; which, multiplied by the length of the piece, gives the content of the benching.

Embankments are only an inversion of cutting, and therefore the above rules hold good, with this difference, viz: the top width of the canal, including both its banks, must be substituted here instead of the bottom width of the canal in the above.

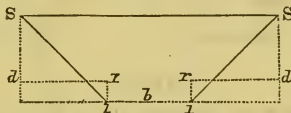
FOURTH METHOD.

Problem.—To find the area of any transverse section, taken at right angles across the line of canal.

CASE I.

Is when the depths dd of the section, from the ground surface SS to the bottom level b of the canal, are every where the same.

Fig. 1.



Theorem.— $(rd + b) \times d = \text{the area.}$

Rule.—Multiply the common depth of the section by the ratio of the inside slopes of the canal, and to the product add the canal's bottom width; multiply this sum by the aforesaid depth, and the product will be the area.

Example.—Let us suppose the bottom width to be 16 feet, and the recedence or ratio of the slopes to be as 1.5 horizontally to 1 perpendicular, and let the depth of the section be 8 feet.

Here,

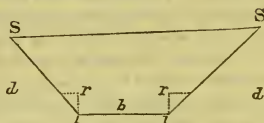
$$\begin{array}{r}
 r = 1.5 \\
 d = 8 \\
 \hline
 rd \quad 12.0 \\
 b = 16.0 \\
 \hline
 rd + b = 28.0 \\
 d = 8 \\
 \hline
 \end{array}$$

224, the area in feet as required.

CASE II.

Is when the depth dd of the section from the ground surface SS to the bottom level d of the canal are unequal.

Fig. 2.



Theorem.— $rd + \frac{d+d}{2} \times b = \text{area.}$

Rule.—To the rectangle of the depths, multiplied by the ratio of the slopes, add half the sum of the depths, multiplied by the bottom width of the canal, and the sum will be the area.

Example.—Let the least depth be 6 feet; the greatest 8 feet; and let every thing else remain as before.

Here,

$$r = 1.5$$

$$d = 6$$

$$rd = 9.0$$

$$d = 8$$

$$rd^2 = 72$$

$$112$$

$$184 = \text{area.}$$

Again,

$$d = 6$$

$$d = 8$$

$$2) 14$$

$$\frac{d+d}{2} = 7$$

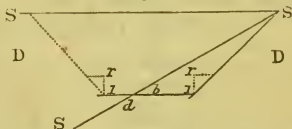
$$b = 16$$

$$\frac{d+d}{2} \times b = 112$$

CASE III.

Is when the surface of the ground (SS) (Fig. 3) intersects the bottom (b) of the canal. In this case d is the depth which the surface of the ground is below the bottom level of the canal at the point whence the produced inside slope of the embanked side meets the said surface.

Fig. 3.



Theorem.— $\frac{\frac{1}{2}b - rd}{d + D} \times D^2 = \text{the area.}$

Rule.—Multiply that depth which is under the bottom level by the ratio of the inside slopes, and subtract the product from half the bottom width of the canal; divide this

difference by the sum of the depths, and multiply the quotient by the square of the depth, which is above the bottom level, the product will be the area.

Example.—Let the depth which the bottom level of the canal is below the surface of the ground be 8 feet, and the depth on the other side which the ground's surface is below the bottom level of the canal be 2 feet, and let every thing else remain as before.

Here,

$$\begin{array}{rcl} \frac{1}{2}b = 8 & D = 8 & \frac{4.5}{10} = .45 = 5 = \frac{\frac{1}{2}b - rd}{d + D} \\ rd = 3.5 & d = 2 & \\ \frac{1}{2}b - rd = 4.5 & d + D = 10 & .45 \times D^2 = 64 \times .45 = 28.80, \text{ the area.} \end{array}$$

Problem.—The area of any irregular section being known, to find a mean depth which a regular section must have to be of the same area.

Theorem.— $\sqrt{\frac{a}{-r} + \frac{b}{2r}} - \frac{b}{2r} =$ the mean depth, where $a =$ the area of the regular section.

Rule.—Divide the bottom width of the canal by twice the ratio of the inside slopes; reserve the quotient. To the area of the section, divided by the said ratios, add the square of the quotient reserved; extract the square root of the sum, and from this root subtract the quotient reserved: the remainder will be the mean depth required.

Example.—Take the area of *Fig. 2* for case the second.

Here,

$$\begin{array}{rcl} 1.5) 184.0 & (12.26 = \frac{a}{r} + \frac{b}{2r})^2 & \\ \underline{15} & + 28.09 & \\ 34 & & \\ 30 & & \\ \underline{40} & & \\ 159 & & \\ 265 & & \\ \underline{265} & & \\ 28.09 = \frac{b}{2r} & & \end{array} \quad \begin{array}{rcl} 34 & & \\ 30 & & \\ \underline{40} & & \\ 30 & & \\ \underline{100} & & \\ 90 & & \\ \underline{10} & & \end{array} \quad \begin{array}{l} 6.3 - 5.3 = \sqrt{\frac{a}{r} + \frac{b}{2r}} - \frac{b}{2r} \text{ the mean required.} \end{array}$$

ANGLES OF SLOPES IN CUTTINGS OR EMBANKMENTS.

Slopes.	Angles.
$\frac{1}{2}$ to 1	63° 28'
$\frac{3}{4}$ to 1	53° 8'
1 to 1	45° 0'
$1\frac{1}{4}$ to 1	38° 40'
$1\frac{1}{2}$ to 1	33° 42'
2 to 1	26° 34'
3 to 1	18° 26'

DIAGRAMS.

To cut off a given Area, having the angles at A and B, and the line A B given.

Fig. 1.

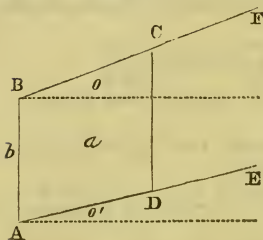
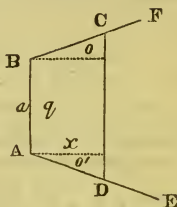


Fig. 2.



$$\text{Thus: } x = \pm \frac{b}{C} + \sqrt{\frac{2C}{C^2} \frac{a+b^2}{C^2}}$$

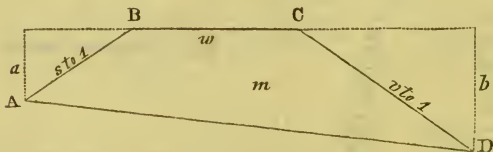
$$\text{Thus: } x = \sqrt{\frac{2q}{C} + \left(\frac{a}{C}\right)^2} \pm \frac{a}{C}$$

$C = o - o'$ where $o =$ Natural Tangent.
 $a =$ area.

$C = o + o'$ where $o =$ Natural Tangent.
 $q =$ area.

To calculate the Area A B C D, having w a b and the Slopes given.

Fig. 3.

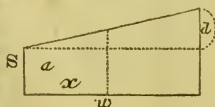


$$\text{Thus: } \left(\frac{s+v}{2}\right) a b + w \left(\frac{a+b}{2}\right) = m$$

where $m =$ area, s and v the ratio of slopes.

To cut off a given Area, having the Sides s d and w given.

Fig. 4.

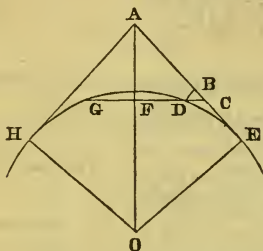


$$\text{Thus: } x = \sqrt{\frac{2w a}{d} + \left(\frac{w s}{d}\right)^2} - \frac{w s}{d}$$

where $a =$ area.

Having the angle at A, the side A B, and the side B D, given, to pass a curve through the point at D, and tangent to A H and A E.

Fig. 5.



Find the lines G C, B C, and D C. Then $\sqrt{G C \times D C} = E C$, and $E C + B C + A B = \text{Tangent } A E$, from which Radius O A may readily be obtained.

TABLE

OF

INCLINED PLANES.

Showing the Ascent or Descent per yard, and the corresponding Ascent or Descent per chain, per mile; and also the Ratio.

Per yard.		Pr. ch'n.	Pr. mile.	Ratio.	Per yard,		Per chain.	Per mile.	Ra.
In parts of an inch.	In decs. of an in.	Inches.	Feet.	One in	In parts of an inch.	In decs. of an in.	Inches.	Feet.	On in
1-64th	·0156	·344	2·29	2304	7 16ths	·4375	9·625	64·17	82
1-48th	·0208	·458	3·06	1728	5-10ths	·5	11	73·33	72
1-32d	·0312	·687	4·58	1152	9-16ths	·5625	12·375	82·5	64
1-24th	·0417	·917	6·11	864	7-12ths	·5833	12·833	85·56	62
1-16th	·0625	1·375	9·17	576	3-5ths	·6	13·2	88	60
1-12th	·0833	1·833	12·22	432	5-8ths	·625	13·75	91·67	58
1-10th	·1	2·2	14·67	360	2-3ds	·6667	14·667	97·78	54
1-8th	·125	2·75	18·33	288	11-16ths	·6875	15·125	100·83	52
1-6th	·1667	3·667	24·44	216	7-10ths	·7	15·4	102·67	51
3-16ths	·1875	4·125	27·50	192	3-4ths	·75	16·5	110	48
1-5th	·2	4·4	29·33	180	4-5ths	·8	17·6	117·33	45
1-4th	·25	5·5	36·67	144	13-16ths	·8125	17·875	119·17	44
3-10ths	·3	6·6	44	120	5-6ths	·8333	18·333	122·22	43
5-16ths	·3125	6·875	45·83	115	7-8ths	·875	19·25	128·33	41
1-3d	·3333	7·333	48·89	108	9-10ths	·9	19·8	132	40
3-8ths	·375	8·25	55	96	11-12ths	·9167	20·167	134·44	39
2-5ths	·4	8·8	58·67	20	15-16ths	·9375	20·625	137·5	38
5-12ths	·4167	9·167	61·11	86	1 inch.	1 in.	22	146·67	36

APPROXIMATING TABLE

OF

LONGITUDES IN TIME AT DIFFERENT PLACES IN THE UNITED STATES.

	BUFFALO.	PROVIDENCE.	WASHINGTON.	BALTIMORE.	PHILADELPHIA.	ALBANY.	NEW YORK.	NEW HAVEN.	HARTFORD.	SPRINGFIELD.	WORCESTER.	BOSTON.
BOSTON.	M. S. 31' 24"	M. S. 1' 23"	M. S. 49' 52"	M. S. 14' 16"	M. S. 10' 43"	M. S. 11' 48"	M. S. 7' 31"	M. S. 6' 27"	M. S. 6' 7"	M. S. 2' 57"		
WORCESTER.	28' 27"	1' 34"	21' 52"	19' 17"	13' 26"	7' 46"	8' 41"	4' 34"	3' 30"	3' 10"		
SPRINGFIELD.	24' 17"	4' 44"	17' 42"	16' 7"	10' 16"	9' 56"	5' 41"	4' 24"	20"			
HARTFORD.	24' 57"	5' 5"	4' 17'	22' 15'	27' 14'	43' 8'	52' 3'	12' 4'	17'			
NEW HAVEN.	23' 53"	5' 8'	16' 18'	14' 43'	8' 52'	4' 35'	1'					
NEW YORK.	19' 36"	10' 25"	12' 1'	10' 26"	4' 35'	1'						
ALBANY.	20' 41"	9' 20"	14' 6'	11' 31"	5' 40"							
PHILADELPHIA.	15' 1"	15' 0"	7' 26"	5' 51"								
BALTIMORE.	9' 10"	20' 51"	1' 35"									
WASHINGTON.	7' 35"	22' 26"										
PROVIDENCE.												
BUFFALO.	30' 1"											

THE above Time Table is computed, having Hartford, Conn., as the point from which the calculations were made. Those places which are east of Hartford are *fast* in time; while those which are *west* are *slow*, by all the difference shown in the above table. For example, a watch giving *true* time at Boston, will be 11 minutes 48 seconds too slow at New York, and *vice versa*.

TABLE.

Latitude.	Seconds gained by a clock per day.	Additional length required to correct the error in inches.	Latitude.	Seconds gained by a clock per day.	Additional length required to correct the error in inches.
5°	1.7	0.0016	50°	134.0	0.1212
10	6.9	0.0062	55	150.2	0.1386
20	26.7	0.0246	60	171.2	0.1549
30	57.1	0.0516	75	213.0	0.1927
45	114.1	0.1033	90	228.5	0.2065

A pendulum, keeping mean time at the equator, will go faster as the degrees of latitude increase, as exhibited in the above table. See Table, page 23.

TABLE

EXHIBITING THE EXPERIMENTAL STRENGTH

Of various species of Timber opposed to a transverse strain.

Kinds of Wood.	Specific Gravity.	Length in feet.	Breadth in inches.	Depth in inches.	Deflection at the time of fracture.	Breaking wt. in pounds.	Value of constant strength.	Authorities.
Oak, English, young tree	.863	2.	1	1	1.87	482	2892	Tredgold.
Do. old ship timber . . .	.872	2.5	1	1	1.5	264	1980	do.
Do. from old tree . . .	.625	2.	1	1	1.38	218	1308	do.
Do. medium quality . . .	.748	2.5	1	1		284	2130	Ebbels.
Do. green . . . . .	.763	2.5	1	1		219	1741	do.
Do. do.	1.063	11.75	8.5	8.5	3.2	24812	1785	Buffon.
Beech, medium quality	.690	2.5	1	1		271	2031	Ebbels.
Alder . . . . .	.555	2.5	1	1		212	1590	do.
Plane tree . . . . .	.648	2.5	1	1		243	1821	do.
Sycamore . . . . .	.590	2.5	1	1		214	1605	do.
Chestnut tree . . . . .	.875	2.5	1	1		180	1350	do.
Ash, from young tree . . .	.811	2.5	1	1	2.5	324	2430	Tredgold.
Do. medium quality . . .	.690	2.5	1	1		254	1905	Ebbels.
Ash . . . . .	.753	2.5	1	1	2.38	314	2355	Tredgold.
Elm, common . . . . .	.544	2.5	1	1		216	1620	Ebbels.
Do. wych, green . . . . .	.763	2.5	1	1		192	1440	do.
Acacia, green . . . . .	.820	2.5	1	1		249	1866	do.
Mahogany, Spanish, dry	.852	2.5	1	1		170	1275	Tredgold.
Do. Honduras, seasoned	.256	2.5	1	1		255	1911	do.
Walnut, green . . . . .	.925	2.5	1	1		195	1461	Ebbels.
Teak . . . . .	.744	7.	2	2	4.00	820	2151	Barlow.
Willow . . . . .	.405	2.5	1	1	3.	146	1095	Tredgold.
Birch . . . . .	.720	2.5	1	1		207	1551	Ebbels.
Cedar of Libanus, dry . . .	.586	2.5	1	1	2.75	165	1236	Tredgold.
Riga fir . . . . .	.480	2.5	1	1	1.3	212	1590	do.
Memel fir . . . . .	.553	2.5	1	1	1.15	218	1635	do.
Norway fir fm. Longsound	.639	2.	1	1	1.125	396	2376	do.
Mar forest fir . . . . .	.715	7.	2	2	5.5	360	945	Barlow.
Scotch fir, Eng. growth	.529	2.5	1	1	1.75	233	1746	Tredgold.
Do. do. . . . .	.460	2.5	1	1		157	1176	Ebbels.
Christiana white deal . . .	.512	2.	1	1	.937	343	2058	Tredgold.
American white spruce . . .	.465	2.	1	1	1.362	285	1710	do.
Spruce fir, British growth	.555	2.5	1	1		186	1395	Ebbels.
American pine, Weymouth	.460	2.0	1	1	1.125	329	1974	Tredgold.
Larch, choice specimen	.640	2.5	1	1	3.0	253	1896	do.
Do. medium quality . . .	.622	2.5	1	1		223	1671	do.
Do. very young wood . . .	.396	2.5	1	1	1.78	129	966	do.
English oak . . . . .	.934	7.	2	2	8.1	637	1672	Barlow.
Canadian, do. . . . .	.872	7.	2	2	6.0	673	1766	do.
Dantzic, do. . . . .	.756	7.	2	2	4.86	560	1457	do.
Adriatic, do. . . . .	.993	7.	2	2	5.73	526	1383	do.
Ash . . . . .	.760	7.	2	2	8.92	772	2026	do.
Beech . . . . .	.696	7.	2	2	5.73	593	1556	do.
Pitch pine . . . . .	.660	7.	2	2	6.00	622	1632	do.
Red pine . . . . .	.657	7.	2	2	5.83	511	1341	do.
New England fir . . . . .	.553	7.	2	2	4.66	420	1102	do.

TABLE
OF
THE RELATIVE WEIGHT AND STRENGTH OF ROPES AND CHAINS.

Circumference of Rope in . .	Weight per fathom in lbs.	Diameter of Chain in inches.	Weight per fathom in lbs.	Proof of strength in		Circumference of Rope in . .	Weight per fathom in lbs.	Diameter of Chain in inches.	Weight per fathom in lbs.	Proof of strength in	
				tons.	cwts.					tons.	cwts.
3½	2¼	⅝	5½	1	5½	10	23	⅞	43	10	0
4½	4¼	¾	8	1	16¾	10¾	28	1 ⅝	49	11	11
5	5¾	1 ⅛	10½	2	10	11½	30½	1	56	13	8
5½	7	1 ¼	14	3	5½	12¼	36	1 1 ⅛	63	14	18
6½	9¾	1 ½	18	4	3½	13	39	1 ⅝	71	16	14
7	11¼	1 ⅝	22	5	2	13¾	45	1 ¾	79	18	11
8	15	1 ⅞	27	6	4½	14½	48½	1 ⅞	87	20	8
8¾	19	2	32	7	7	15¼	56	1 ⅞	96	22	13
9½	21	2 ⅛	37	8	13½	16	60	2	106	24	18

TABLE
OF
EXPERIMENTS ON THE STIFFNESS OF DIFFERENT WOODS.

Kinds of Wood.	Spec. gravity.	Length in feet.	Breadth in inch.	Depth in inch.	Deflection. .	Weight which produced deflection.	Value of a from $a = \frac{40 b d^3 \delta}{l^3 W}$.	Authorities.
Ash, young tree, white,	·811	2·5	1	1	0·5	141	·009	Tredgold.
Do. old tree, red, .	·753	2·5	1	1	0·5	113	·0113	do.
Do. medium quality,	·690	2·5	1	1	0·5	78·5	·0163	Ebbels.
Ash,	·760	·7	2	2	1·27	225	·0105	Barlow.
Beech,	·688	·7	2	2	1·025	150	·01277	do.
Teak,	·744	·7	2	2	1·276	300	·0076	do.
Elm,	·540	2·5	2	2	1·42	125	·0212	do.
Elm,	·544	2·5	1	1	0·5	99·5	·0128	Ebbels.
Cedar of Lebanon, . .	·486	2·5	1	1	0·5	36	·0355	Tredgold.
Maple, common . . .	·625	2·5	1	1	0·5	65	·0197	do.
Abele,	·511	2·5	1	1	0·5	84	·0152	do.
Willow,	·405	2·5	1	1	0·5	41	·031	do.
Horse chestnut, . . .	·483	2·5	1	1	0·5	79	·0162	do.
Lime tree,	·483	2·5	1	1	0·5	84	·0152	do.
Walnut, green . . .	·920	2·5	1	1	0·5	62	·020	Ebbels.
Chestnut, Spanish . .	·895	2·5	1	1	0·5	68·5	·0187	do.
Acacia,	·820	2·5	1	1	0·5	125	·0102	do.
Plane, dry,	·648	2·5	1	1	0·5	99·5	·0128	do.
Alder, do.	·555	2·5	1	1	0·5	80·5	·0159	do.
Birch, do.	·720	2·5	1	1	0·5	90·5	·0141	do.
Wych elm, green, . .	·763	2·5	1	1	0·5	92	·014	do.
Lombardy poplar, dry,	·374	2·5	1	1	0·5	56·5	·0224	do.
Mahogany, Honduras,	·560	2·5	1	1	0·5	118	·0109	Tredgold.
Do. Spanish, . . .	·853	2·5	1	1	0·5	93	·0137	do.
Sycamore,	·590	2·5	1	1	0·5	76	·0168	Ebbels.
Pear, green,	·792	2·5	1	1	0·5	59·5	·0215	do.
Cherry, do.	·690	2·5	1	1	0·5	92·5	·0138	do.
Beech, dry,	·696	2·5	1	1	0·5	97·5	·0131	do.

TABLE
OF
THE WEIGHT, IN LBS.
Of a foot in length of Cast Iron.

Side of the square or diameter. inches.	Square.	Hex'on.	Oct'gon.	Circle.	Side of the square or diameter. inches.	Square.	Hex'on.	Oct'gon.	Circle.
$\frac{1}{8}$	.781	.675	.650	.612	$6\frac{1}{8}$	132.031	114.271	109.948	103.696
$\frac{1}{4}$	1.756	1.528	1.471	1.387	$6\frac{1}{4}$	142.381	123.231	118.534	111.825
1	3.125	2.703	2.603	2.454	7	153.125	132.528	127.478	120.372
$1\frac{1}{4}$	4.881	4.225	4.065	3.854	$7\frac{1}{4}$	161.256	142.162	136.743	128.986
$1\frac{1}{2}$	7.031	6.085	5.856	5.521	$7\frac{1}{2}$	175.781	152.037	146.337	138.056
$1\frac{3}{4}$	9.568	8.281	7.971	7.515	$7\frac{3}{4}$	187.693	162.449	156.259	147.415
2	12.520	10.815	10.412	9.815	8	200.000	173.099	166.503	157.078
$2\frac{1}{4}$	15.818	13.990	13.168	12.425	$8\frac{1}{4}$	212.693	184.087	177.071	167.049
$2\frac{1}{2}$	19.531	16.900	16.256	15.337	$8\frac{1}{2}$	225.781	195.412	187.365	177.328
$2\frac{3}{4}$	23.631	20.450	19.671	18.559	$8\frac{3}{4}$	239.256	207.078	199.127	187.912
3	28.125	24.340	23.412	22.087	9	253.125	219.078	210.721	199.203
$3\frac{1}{4}$	33.009	28.565	27.475	25.921	$9\frac{1}{4}$	266.781	231.418	222.600	210.800
$3\frac{1}{2}$	38.281	33.131	31.818	30.065	$9\frac{1}{2}$	282.031	244.100	234.793	221.506
$3\frac{3}{4}$	43.943	38.031	36.581	34.512	$9\frac{3}{4}$	296.968	257.105	247.315	233.318
4	50.000	43.271	41.621	39.268	10	312.500	270.471	260.163	245.437
$4\frac{1}{4}$	56.443	48.353	46.990	44.331	$10\frac{1}{4}$	328.318	284.159	273.341	257.859
$4\frac{1}{2}$	63.281	54.768	52.681	49.700	$10\frac{1}{2}$	344.531	298.193	286.828	270.593
$4\frac{3}{4}$	70.506	61.021	58.696	55.375	$10\frac{3}{4}$	351.131	312.559	300.646	283.633
5	78.125	67.515	65.040	61.359	11	378.125	327.268	314.796	296.978
$5\frac{1}{4}$	86.131	74.549	71.701	67.709	$11\frac{1}{4}$	393.216	342.315	329.268	310.631
$5\frac{1}{2}$	94.531	81.815	78.696	74.243	$11\frac{1}{2}$	410.281	357.693	344.062	324.587
$5\frac{3}{4}$	103.318	89.421	86.015	81.126	$11\frac{3}{4}$	429.023	373.325	359.187	338.856
6	112.500	97.368	93.656	88.354	12	450.000	389.475	374.631	353.428
$6\frac{1}{4}$	122.058	105.640	101.621	95.871					

TABLE
OF
THE WEIGHT OF A CUBIC FOOT OF VARIOUS SUBSTANCES,
In common use for Building.

	lbs.
Sand (solid)	112.5
" (loose)	95
Earth	93.75
Common soil	124
Strong soil	127
Clay	120 to 135
Clay and stone	158
Brick	119
Granite	169
Marble	166 to 169
Sand, 1 cubic yard,	3037
Common soil, 1 cubic yard,	3429

SCANTLING AND TIMBER

ACCURATELY REDUCED TO INCH BOARD MEASURE.

3 by 9.		3 by 10.		3 by 11.		3 by 12.		4 by 4.		4 by 5.	
Length.	1	2.3	Length.	1	2.6	Length.	1	3.	Length.	1	1.8
2	4.6	2	5.	2	5.6	2	6.	2	2.8	2	3.4
3	6.9	3	7.6	3	8.3	3	9.	3	4.	3	5.
4	9.	4	10.	4	11.	4	12.	4	5.4	4	6.8
5	11.3	5	12.6	5	13.9	5	15.	5	6.8	5	8.4
6	13.6	6	15.	6	16.6	6	18.	6	8.	6	10.
7	15.9	7	17.6	7	19.3	7	21.	7	9.4	7	11.8
8	18.	8	20.	8	22.	8	24.	8	10.8	8	13.4
9	20.3	9	22.6	9	24.9	9	27.	9	12.	9	15.
10	22.6	10	25.	10	27.6	10	30.	10	13.4	10	16.8
11	24.9	11	27.6	11	30.3	11	33.	11	14.8	11	18.4
12	27.	12	30.	12	33.	12	36.	12	16.	12	20.
13	29.3	13	32.6	13	35.9	13	39.	13	17.4	13	21.8
14	31.6	14	35.	14	38.6	14	42.	14	18.8	14	23.4
15	33.9	15	37.6	15	41.3	15	45.	15	20.	15	25.
16	36.	16	40.	16	44.	16	48.	16	21.4	16	26.8
17	38.3	17	42.6	17	46.9	17	51.	17	22.8	17	28.4
18	40.6	18	45.	18	49.6	18	54.	18	24.	18	30.
19	42.9	19	47.6	19	52.3	19	57.	19	25.4	19	31.8
20	45.	20	50.	20	55.	20	60.	20	26.8	20	33.4
21	47.3	21	52.6	21	57.9	21	63.	21	28.	21	35.
22	49.6	22	55.	22	60.6	22	66.	22	29.4	22	36.8
23	51.9	23	57.6	23	63.3	23	69.	23	30.8	23	38.4
24	54.	24	60.	24	66.	24	72.	24	32.	24	40.
25	56.3	25	62.6	25	68.9	25	75.	25	33.4	25	41.8
26	58.6	26	65.	26	71.6	26	78.	26	34.8	26	43.4
27	60.9	27	67.6	27	74.3	27	81.	27	36.	27	45.
28	63.	28	70.	28	77.	28	84.	28	37.4	28	46.8
29	65.3	29	72.6	29	79.9	29	87.	29	38.8	29	48.4
30	67.6	30	75.	30	82.6	30	90.	30	40.	30	50.

4 by 6.		4 by 7.		4 by 8.		4 by 9.		4 by 10.		4 by 11.	
Length.	1	2.	Length.	1	2.4	Length.	1	3.	Length.	1	3.8
2	4.	2	4.8	2	5.4	2	6.	2	6.8	2	7.4
3	6.	3	7.	3	8.	3	9.	3	10.	3	11.
4	8.	4	9.4	4	10.8	4	12.	4	13.4	4	14.8
5	10.	5	11.8	5	13.4	5	15.	5	16.8	5	18.4
6	12.	6	14.	6	16.	6	18.	6	20.	6	22.
7	14.	7	16.4	7	18.8	7	21.	7	23.4	7	25.8
8	16.	8	18.8	8	21.4	8	24.	8	26.8	8	29.4
9	18.	9	21.	9	24.	9	27.	9	30.	9	33.
10	20.	10	23.4	10	26.8	10	30.	10	33.4	10	36.8
11	22.	11	25.8	11	29.4	11	33.	11	36.8	11	40.4
12	24.	12	28.	12	32.	12	36.	12	40.	12	44.
13	26.	13	30.4	13	34.8	13	39.	13	43.4	13	47.8
14	28.	14	32.8	14	37.4	14	42.	14	46.8	14	51.4
15	30.	15	35.	15	40.	15	45.	15	50.	15	55.
16	32.	16	37.4	16	42.8	16	48.	16	53.4	16	58.8
17	34.	17	39.8	17	45.4	17	51.	17	56.8	17	62.4
18	36.	18	42.	18	48.	18	54.	18	60.	18	66.
19	38.	19	44.4	19	50.8	19	57.	19	63.4	19	69.8
20	40.	20	46.8	20	53.4	20	60.	20	66.8	20	73.4
21	42.	21	49.	21	56.	21	63.	21	70.	21	77.
22	44.	22	51.4	22	58.8	22	66.	22	73.4	22	80.8
23	46.	23	53.8	23	61.4	23	69.	23	76.8	23	84.4
24	48.	24	56.	24	64.	24	72.	24	80.	24	88.
25	50.	25	58.4	25	66.8	25	75.	25	83.4	25	91.8
26	52.	26	60.8	26	69.4	26	78.	26	86.8	26	95.4
27	54.	27	63.	27	72.	27	81.	27	90.	27	99.
28	56.	28	65.4	28	74.8	28	84.	28	93.4	28	102.8
29	58.	29	67.8	29	77.4	29	87.	29	96.8	29	106.4
30	60.	30	70.	30	80.	30	90.	30	100.	30	110.0

4 by 12.		5 by 5.		5 by 6.		5 by 7.		5 by 8.		5 by 9.	
Length.	1	Length.	1	Length.	1	Length.	1	Length.	1	Length.	1
2	4	2	2.1	2	2.6	2	2.11	2	3.4	2	3.9
3	8	3	4.2	3	5	3	5.10	3	6.8	3	7.6
4	12	4	6.3	4	7.6	4	8.9	4	10	4	11.3
5	16	5	8.4	5	10	5	11.8	5	13.4	5	15
6	20	6	10.5	6	12.6	6	14.7	6	16.8	6	18.9
7	24	7	12.6	7	14.7	7	17.6	7	20	7	22.6
8	28	8	14.7	8	16.8	8	20.5	8	23.4	8	26.3
9	32	9	16.8	9	20	9	23.4	9	26.8	9	30
10	36	10	18.9	10	22.6	10	26.3	10	30	10	33.9
11	40	11	20.10	11	25	11	29.2	11	33.4	11	37.6
12	44	12	22.11	12	27.6	12	32.1	12	36.8	12	41.3
13	48	13	25	13	30	13	35	13	40	13	45
14	52	14	27.1	14	32.6	14	37.11	14	43.4	14	48.9
15	56	15	29.2	15	35	15	40.10	15	46.8	15	52.6
16	60	16	31.3	16	37.6	16	43.9	16	50	16	56.3
17	64	17	33.4	17	40	17	46.8	17	53.4	17	60
18	68	18	35.5	18	42.6	18	49.7	18	56.8	18	63.9
19	72	19	37.6	19	45	19	52.6	19	60	19	67.6
20	76	20	39.7	20	47.6	20	55.5	20	63.4	20	71.3
21	80	21	41.8	21	50	21	58.4	21	66.8	21	75
22	84	22	43.9	22	52.6	22	61.3	22	70	22	78.9
23	88	23	45.10	23	55	23	64.2	23	73.4	23	82.6
24	92	24	47.11	24	57.6	24	67.1	24	76.8	24	86.3
25	96	25	50	25	60	25	70	25	80	25	90
26	100	26	52.1	26	62.6	26	72.11	26	83.4	26	93.9
27	104	27	54.2	27	65	27	75.10	27	86.8	27	97.6
28	108	28	56.3	28	67.6	28	78.9	28	90	28	101.3
29	112	29	58.4	29	70	29	81.8	29	93.4	29	105
30	116	30	60.5	30	72.6	30	84.7	30	96.8	30	108.9
	120		62.6		75		87.6		100		112.6

5 by 10.		6 by 6.		6 by 7.		6 by 8.		7 by 7.		7 by 8.	
Length.	1	Length.	1	Length.	1	Length.	1	Length.	1	Length.	1
2	4.2	2	3	2	3.6	2	4	2	4.1	2	4.8
3	8.4	3	6	3	7	3	8	3	8.2	3	9.4
4	12.6	4	9	4	10.6	4	12	4	12.3	4	14
5	16.8	5	12	5	14	5	16	5	16.4	5	18.8
6	20.10	6	15	6	17.6	6	20	6	20.5	6	23.4
7	25	7	18	7	21	7	24	7	24.6	7	28
8	29.2	8	21	8	24.6	8	28	8	28.7	8	32.8
9	33.4	9	24	9	28	9	32	9	32.8	9	37.4
10	37.6	10	27	10	31.6	10	36	10	36.9	10	42
11	41.8	11	30	11	35	11	40	11	40.10	11	46.8
12	45.10	12	33	12	38.6	12	44	12	44.11	12	51.4
13	50	13	36	13	42	13	48	13	49	13	56
14	54.2	14	39	14	45.6	14	52	14	53.1	14	60.8
15	58.4	15	42	15	49	15	56	15	57.2	15	65.4
16	62.6	16	45	16	52.6	16	60	16	61.3	16	70
17	66.8	17	48	17	56	17	64	17	65.4	17	74.8
18	70.10	18	51	18	59.6	18	68	18	69.5	18	79.4
19	75	19	54	19	63	19	72	19	73.6	19	84
20	79.2	20	57	20	66.6	20	76	20	77.7	20	88.8
21	83.4	21	60	21	70	21	80	21	81.8	21	93.4
22	87.6	22	63	22	73.6	22	84	22	85.9	22	98
23	91.8	23	66	23	77	23	88	23	89.10	23	102.8
24	95.10	24	69	24	80.6	24	92	24	93.11	24	107.4
25	100	25	72	25	84	25	96	25	98	25	112
26	104.2	26	75	26	87.6	26	100	26	102.1	26	116.8
27	108.4	27	78	27	91	27	104	27	106.2	27	121.4
28	112.6	28	81	28	94.6	28	108	28	110.3	28	126
29	116.8	29	84	29	98	29	112	29	114.4	29	130.8
30	120.10	30	87	30	101.6	30	116	30	118.5	30	135.4
	125		90		105		120		122.6		140

7 by 9.		8 by 8.		8 by 9.		8 by 10.		9 by 9.		9 by 10.	
Length.	1	5·3	Length.	1	5·4	Length.	1	6·8	Length.	1	7·6
2	10·6	2	10·8	2	12·	2	13·4	2	13·6	2	15·
3	15·9	3	16·	3	18·	3	20·	3	20·3	3	22·6
4	21·	4	21·4	4	24·	4	26·8	4	27·	4	30·
5	26·3	5	26·8	5	30·	5	33·4	5	33·9	5	37·6
6	31·6	6	32·	6	36·	6	40·	6	40·6	6	45·
7	36·9	7	37·4	7	42·	7	46·8	7	47·3	7	52·6
8	42·	8	42·8	8	48·	8	53·4	8	54·	8	60·
9	47·3	9	48·	9	54·	9	60·	9	60·9	9	67·6
10	52·6	10	53·4	10	60·	10	66·8	10	67·6	10	75·
11	57·9	11	58·8	11	66·	11	73·4	11	74·3	11	82·6
12	63·	12	64·	12	72·	12	80·	12	81·	12	90·
13	68·3	13	69·4	13	78·	13	86·8	13	87·9	13	97·6
14	73·6	14	74·8	14	84·	14	93·4	14	94·6	14	105·
15	78·9	15	80·	15	90·	15	100·	15	101·3	15	112·6
16	84·	16	85·4	16	96·	16	106·8	16	108·	16	120·
17	89·3	17	90·8	17	102·	17	113·4	17	114·9	17	127·6
18	94·6	18	96·	18	108·	18	120·	18	121·6	18	135·
19	99·9	19	101·4	19	114·	19	126·8	19	128·3	19	142·6
20	105·	20	106·8	20	120·	20	133·4	20	135·	20	150·
21	110·3	21	112·	21	126·	21	140·	21	141·9	21	157·6
22	115·6	22	117·4	22	132·	22	146·8	22	148·6	22	165·
23	120·9	23	122·8	23	138·	23	153·4	23	155·3	23	172·6
24	126·	24	128·	24	144·	24	160·	24	162·	24	180·
25	131·3	25	133·4	25	150·	25	166·8	25	168·9	25	187·6
26	136·6	26	138·8	26	156·	26	173·4	26	175·6	26	195·
27	141·9	27	144·	27	162·	27	180·	27	182·3	27	202·6
28	147·	28	149·4	28	168·	28	186·8	28	189·	28	210·
29	152·3	29	154·8	29	174·	29	193·4	29	195·9	29	217·6
30	157·6	30	160·	30	180·	30	200·	30	202·6	30	225·

9 by 11.		10 by 10.		10 by 11.		10 by 12.		11 by 11.		11 by 12.	
Length.	1	8·3	Length.	1	8·4	Length.	1	9·2	Length.	1	11·
2	16·6	2	16·8	2	18·4	2	20·	2	20·2	2	22·
3	24·9	3	25·	3	27·6	3	30·	3	20·3	3	33·
4	33·	4	33·4	4	36·8	4	40·	4	40·4	4	44·
5	41·3	5	41·8	5	45·10	5	50·	5	50·5	5	55·
6	49·6	6	50·	6	55·	6	60·	6	60·6	6	66·
7	57·9	7	58·4	7	64·2	7	70·	7	70·7	7	77·
8	66·	8	66·8	8	73·4	8	80·	8	80·8	8	88·
9	74·3	9	75·	9	82·6	9	90·	9	90·9	9	99·
10	82·6	10	83·4	10	91·8	10	100·	10	100·10	10	110·
11	90·9	11	91·8	11	100·10	11	110·	11	110·11	11	121·
12	99·	12	100·	12	110·	12	120·	12	121·	12	132·
13	107·3	13	108·4	13	119·2	13	130·	13	131·1	13	143·
14	115·6	14	116·8	14	128·4	14	140·	14	141·2	14	154·
15	123·9	15	125·	15	137·6	15	150·	15	151·3	15	165·
16	132·	16	133·4	16	146·8	16	160·	16	161·4	16	176·
17	140·3	17	141·8	17	155·10	17	170·	17	171·5	17	187·
18	148·6	18	150·	18	165·	18	180·	18	181·6	18	198·
19	156·9	19	158·4	19	174·2	19	190·	19	191·7	19	209·
20	165·	20	166·8	20	183·4	20	200·	20	201·8	20	220·
21	173·3	21	175·	21	192·6	21	210·	21	211·9	21	231·
22	181·6	22	183·4	22	201·8	22	220·	22	221·10	22	242·
23	189·9	23	191·8	23	210·10	23	230·	23	231·11	23	253·
24	198·	24	200·	24	220·	24	240·	24	242·	24	264·
25	206·3	25	208·4	25	229·2	25	250·	25	252·1	25	275·
26	214·6	26	216·8	26	238·4	26	260·	26	262·2	26	286·
27	222·9	27	225·	27	247·6	27	270·	27	272·3	27	297·
28	231·	28	233·4	28	256·8	28	280·	28	282·4	28	308·
29	239·3	29	241·8	29	265·10	29	290·	29	292·5	29	319·
30	247·6	30	250·	30	275·0	30	300·	30	302·6	30	330·

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one arpen = $2,91\frac{2}{3}$ links

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